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Permanent Secretary Denison Scientific Association

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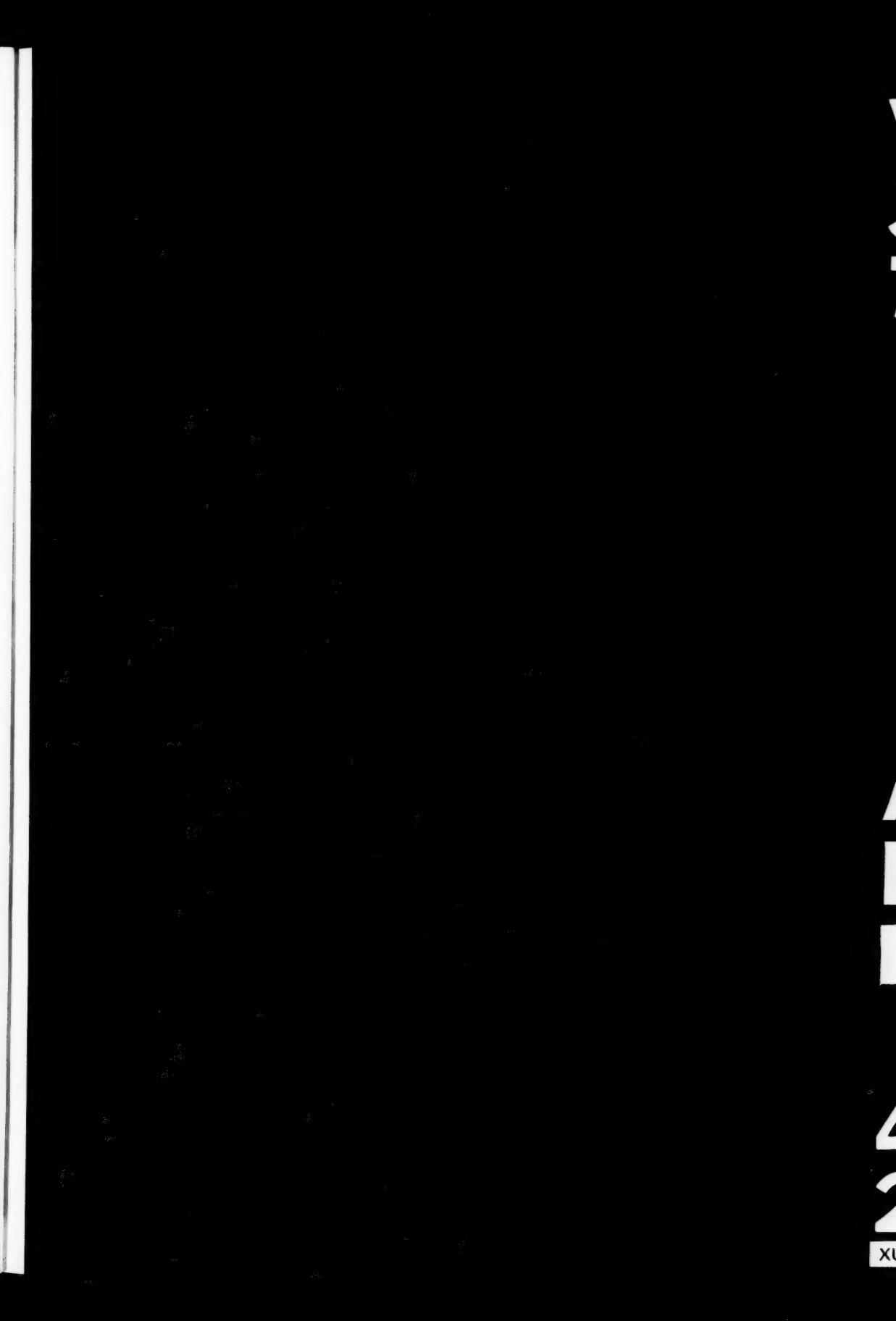
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A PRELIMINARY REVISION OF HESPERIA

ARTHUR WARD LINDSEY

Received March 9, 1942; published May 20, 1942

When *The Hesperioidea of America, North of Mexico*, was written in 1919 the best source of collected information on the identity of North American skippers was the Barnes collection at Decatur, Illinois. Dr. McDunnough's studies of types in many museums and the numerous specimens bearing his notations on comparison with types contributed heavily to the greatness of the collection, and the abundance of material accumulated through Dr. Barnes' lavish methods was of immeasurable value. The Barnes Museum was deservedly a Mecca for lepidopterists.

In the last stages of my work on the revision of the family I had access to this fine collection for a short period and later, as curator of the collection, I spent the greater part of three years with it. Even though the work of those years was largely routine and the research accomplished was chiefly work on moths with the revision of the Family Pterophoridae as a *magnum opus*, I recall with some chagrin the state of the genus *Hesperia* that I permitted to exist. There is some consolation in the fact that others had also accepted a deplorable uncertainty in this genus, but why it should have weathered the growing devotion to skipper studies until the present I am puzzled to know. Certainly the Barnes collection contained enough material for a creditable revision.

When Bell and Williams shared the revision of my old study in 1930 little more had been added to our knowledge of this genus. Bell had described *dodgei* and *lasus* had been turned up in fair abundance in Utah in 1922, but we were still listing *licinus*, *oregonia*, *cabelus*, *harpalus* and *horus* in uncertain terms and *paawnee* was linked with *otloe* as a form. Now only *horus* is uncertain; I doubt very much that it belongs in the genus, but since the type is a female only an opportunity to examine it can decide the matter. Unfortunately I have not been able to visit Cambridge to see this type since beginning this study. With this one exception *Hesperia* is now ready for a more positive review.

The idea of this revision came to me in 1937 when I was forced to tell Brigadier Evans in the Museum of Natural History in London that I could offer no helpful suggestions on his arrangement of the genus. An American unable to arrange an American genus with confidence! My collection had gone to the Carnegie Museum years before, but on my return to the States I felt that I must secure and care for enough material in this limited group to provide for the thorough study that seemed necessary, in spite of multiplied professional responsibilities of very different nature. Recognizing the uniformity of the genus and the great variability of many species I planned to secure a large series of each species and to

forget the factor of time in studying them carefully and working up an ample and well-illustrated monograph. But the world has now gone mad again. It is impossible to say when my plans can be consummated, hence it seems wiser to offer a condensed treatment now on the basis of the work completed to date.

The material on which this report is based is principally my own collection of approximately 1300 specimens, secured since 1937 by purchase, exchange and personal collecting of limited extent. This collection includes every known species. I was fortunate enough to secure from Europe before the war began at least a small series of each European, Asiatic and African species, and to examine through the kindness of Brigadier W. H. Evans a representative collection of all species in the British Museum. In America my good friends Captain R. C. Williams, Jr., and Mr. E. L. Bell have sent material from the Philadelphia Academy and the American Museum respectively. Mr. N. D. Field very kindly arranged for me to see the skippers of the University of Kansas collection, including interesting items from the Snow collection, and more recently has sent specimens from the United States National Museum. Through the kindness of the late Dr. Hugo Kahl I spent a delightful day in the Carnegie Museum, chiefly in the study of Edwards' types, and was able to borrow some helpful material for further study. Dr. H. C. Severin found time in his busy round of duties to ship me the collection of the South Dakota State College, including the material collected by Truman at Volga, South Dakota, with the largest series of *dacotae* that I have ever seen. Mr. J. W. Tilden has collected some fine material for me and has loaned specimens from his collection. Mr. Robert Whittaker of Topeka, Kansas, in submitting specimens for identification and later collecting in Colorado and making some excellent field observations, has provided the solution of one of the most difficult problems in the genus. Mr. R. A. Leussler of Omaha, Nebraska, has sent me paratypes of his *yosemite* and *pahaska*, as well as some interesting specimens from the Black Hills and from northern Minnesota. Mr. Dean F. Berry of Orlando, Florida, has secured me an excellent series of *meskei*. Mr. Lowell Hulbirt of Glendora, Cal., provided the type series and later additional specimens of *hulbirti*. I have also had small amounts of material from several other museums and collectors. For all of this generous assistance I extend my gratitude and thanks.

In writing this report I have had to compromise with time and financial resources. Colored illustrations of well-chosen specimens would make the genus far more intelligible to the lepidopterists who have the greatest need for such revisions, but at present they are out of the question. Perhaps the end of the war may again make such ventures possible—and perhaps they are part of a time that is gone forever.

Meanwhile I expect to continue working with the genus. I shall be glad to identify material on the usual terms and, since I have need for only a few species, shall usually not care to retain the customary share of such material. I want especially to hear from collectors in the north central states and in the southwest. Material from Wisconsin, Minnesota, the Dakotas and Montana, and the border states should clarify some points of distribution. If this paper comes into the

hands of Florida or Texas collectors who can supply good series of *attalus* and its form *seminole* I shall be glad to hear from them. In short, I have a few specific desires but I shall be glad to correspond generally on *Hesperia*.

Genus *Hesperia* Fabricius

Logotype *Papilio comma* Linnaeus

Hesperia Fabricius, Ent. Syst. III (I), 258, 1793.

Barnes and Lindsey, Ann. Ent. Soc. Am. XV, 94, 1922.

Lindsey, Ann. Ent. Soc. Am. XVIII, 89, 1925.

Lindsey, Bell and Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 80, 1931.

Macy and Shepard, Butterflies, 205, 1941.

Pamphila Fabricius, Ill. Mag. VI, 287, 1807. Logotype *Papilio comma* Linn.

Seudder, Rept. Peab. Acad. 1871, 77 (56), 1872.

Edwards, Cat. Lep. Am. 50, 65, 1877.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N. A. III (2), 125, 1916.

Lindsey, U. of Ia. Studies in Nat. Hist. IX (4), 66, 1921.

McDunnough, Mem. S. Cal. Acad. Sci. I, 32, 1938.

Ocytes Seudder, Rept. Peab. Acad., 1871, 76 (55), 1872. Orthotype *Hesperia metea* Seudder.

Anthomaster Seudder, Rept. Peab. Acad. 1871, 78 (57), 1872. Orthotype *Hesperia leonardus* Harris.

†*Erynnis* Seudder (not Schrank), Proc. Am. Acad. Arts & Sci. X 167, 1875.

Holland, Butterfly Book. 346, 1898.

Godman & Salvin, Biol. Cent.-Am., Rhop. II, 477, 1900.

Dyar, Jn. N. Y. Ent. Soc. XIII, 129, 1905.

Holland, Butterfly Book, Rev. Ed., 370, 1931.

†*Urbicola* Tutt, British Butterflies 152, 1906.

This genus is a well marked category standing high in the subfamily and distinguished most strikingly by the stigma of the male. Palpi upturned, compact; second joint with smooth scaly vestiture containing some hairlike scales; third about one-half as long as second but partly concealed. Antennae less than one-half length of primaries; club large with a very short apiculus, slightly longer in female but never approaching thickness of club. Costa of primaries slightly emarginate to very slightly convex; outer margin slightly sinuate to slightly rounded, more rounded in females. Secondaries rounded, slightly lobed at anal angle. In all species the wings of the female are longer and more rounded than those of the male. Vein M_2 of primaries arises very near M_3 ; Cu_1 near end of cell; Cu_2 about intermediate between Cu_1 and base of wing; cell slightly over three-fifths as long as wing. R of secondaries slightly nearer to end of cell than to SC. Mid tibiae strongly spined. Male stigma strong, slender, only slightly curved, and usually showing a conspicuous pale center stripe with black margins; made up of a long segment behind Cu_1 , at least partly apposed to the cubital stem, and a short segment behind Cu_2 , set outside the first but continuous with it.

Although the stigma is the only conspicuous distinctive detail the general habitus is easily recognized after a little work with the genus. Females, as is commonly true among the skippers, are less easily placed unless their superficial markings are distinctive. They differ in an elusive way that the practiced eye can detect, but I doubt that any pen can satisfactorily describe the distinction. On this almost intuitional appreciation alone I rest my conclusion that *horus* is

not a *Hesperia*, although I do so with reservations since I have seen only a photograph of the type.

The structure of the male genitalia is also typical, all species following a uniform pattern with fairly wide variation in detail. The uniformity of these organs and of the stigma leads me to feel no hesitation whatever in excluding *morrisoni* Edwards in spite of some superficial resemblance to various species of *Hesperia*. The genitalia are not, however, uniformly valid for the separation of species. As in so many other groups they are only a help, not a solution of all problems. I have made many slides of western species and forms once grouped as subdivisions of *comma* Linn. without finding trustworthy differences, yet the reasons stated in the discussion of these species evidently justify dividing the group into species as well as subspecific categories. In other cases, such as the separation of *pahaska* from *viridis*, the genitalia provide a reassuring check if one cannot be sure of the superficial differences. I have also examined the genitalia of a few females and have found recognizable differences between easily distinguished species but nothing that would separate the forms of puzzling taxonomic rank.

The genitalia may vary considerably and in addition their heavy structure interferes with uniform mounting to such an extent that the position of the structures in a microscope slide may be a source of great apparent differences in the relative position and size of some parts. In short, the study of genitalia requires as careful observation and judgment as that of superficial characters.

The distinctive characters are the form of the uncus and valves as far as I have been able to note. For this reason I am furnishing only simple line drawings of these parts showing the mesial aspect of the valve and the lateral aspect of the uncus. They have been traced from projected images, hence they do not compensate for the position of the objects in the slide. I have, however, selected the slides carefully to avoid printing any misleading errors.

The genus as limited here occurs north of the tropic of Cancer and chiefly in North America. On our continent I recognize twenty-three species, ranging from Labrador to British Columbia and south into Florida and the extreme north of Mexico. In Europe the type species, *comma* Linn., is the prevailing representative and there is some uncertainty about the occurrence of other species in marginal areas. *Benuncas* Obth. occurs in Northern Africa and Asia Minor, *mixta* Alph. and *dimila* Moore in Asia, and *florinda* Butl. in Japan and the extreme east of Asia. Like most European species, *comma* has received a host of subspecific names, of little value if any, and a few of the other species carry subdivisions.

The extreme variation within species makes the work of separating them very difficult. While a few are very distinct, most follow the same pattern so closely that even if typical specimens are easily recognized occasional variants break down the value of details that might serve for simple and positive identification.

All in all, this summary does not suggest that the treatment of the genus can be reduced to a satisfactorily scientific basis at present. It cannot. Where we must depend wholly on adult insects, usually without data other than date and locality, the solving of difficult points of taxonomy is often a matter of pure

guesswork, even though we are prone to dignify it as scientific judgment. Such difficult cases occur here and there among the butterflies in genera that are otherwise comparatively easy to handle. Witness the *persius* group in *Erynnis* (*Thanaos*). In *Hesperia* a similar difficulty exists in the assemblage of North American forms previously listed as subdivisions of the European species *comma* Linn. I believe that the arrangement of these forms finally adopted here is a better expression of natural relationships, but I believe also that it may very well undergo further revision.

In this complex, which I have grouped recently under *colorado* Schd. a study of life histories is very much to be desired. The group has been baffling. I have had to modify my idea of relationships when the description of *ochracea*, a supposed form of *colorado*, was scarcely off the press, and additional data may very well lead to other changes. Unfortunately it is not easy to secure the quantities of western material that are needed for the usual taxonomic procedures, and life histories are almost entirely unknown.

Because of the uniformity of pattern in the genus, a basic description here will save much space in the treatment of species. The relative development of the various details can then be taken up in the key and in the discussions of species with little repetition.

BASIC DESCRIPTION OF SPECIES

Males: Upper surface characteristically grayish or brownish black to black marginally, (the fuscous of early writers), this color varying from a thin terminal line to a ground color involving almost the entire wing. Remainder varying from a pale tawny or yellow-fulvous to a deep reddish fulvous. This shade occupies most of the wing in some specimens, but is normally restricted to a definite macular pattern with some diffusely shaded areas. Commonly the entire discal area of the primaries is so marked, with the exception of the black stigma. Beyond the cell three small subapical spots between R_3 and M_1 are usually present in the fuscous area; they may be the palest marks on the wing. Two spots between M_1 and M_3 are set nearer the outer margin, and a row of three between M_3 and 1st A extends obliquely basad and toward the inner margin. The last is a complex spot, sometimes hour-glass-shaped and often with the portion nearest A diffuse.

On the secondaries an angulate row of similar spots may be present or all may be lost in the fulvous disc.

On the under side of the secondaries and the apex of the primaries as far as it is exposed when the wings are folded the ground color is usually different from the rest of the primaries, varying from pale ochreous to blackish and in several species bearing an overscaling of gray, ochreous or green scales. The base and disc of the primaries retain some suggestion of fulvous, often quite pale. The extradiscal row of spots described on the upper surface may be reproduced here, often as sharply defined white spots but sometimes merely pale, sometimes diffuse, sometimes reduced in size or number and sometimes totally lacking. Those of the costal portion of the primaries usually resemble those of the secondaries closely. As many as three similar spots may appear at the base of the secondaries, one before, one behind and one at the end of the cell.

Females: The absence of a stigma is accompanied by an extension of the dark color of the wing over the discal area so that darker specimens show a more generally restricted maculation. Some diffuse fulvous extends variably over this area but the cell and costal area are most commonly marked with this shade. The fulvous of the cell shows a tendency to end outwardly in a vaguely defined double spot which may persist even when the rest of the cell is dark. The extradiscal spots are much as in the male.

On the under surface females frequently differ from males in the color and size of spots and color of overscaling. Commonly the spots are larger and paler than in the male, although they may vary in this sex as well as in the male from maximum size and number to total absence in specimens of the same form.

The upper surface is of comparatively little value taxonomically, although its general depth of color, the definition of the markings, and the form of the stigma are sometimes valuable. Average insects of this genus are of the medium fulvous so common among butterflies, with rather broad brownish black margins. A few are much darker and a few paler. Also the pale areas in a few cases have a translucent appearance with the extradiscal spots appearing slightly paler against them. Specific distinctions are far more plentiful on the under side, although even there the relative development of some characters must be used.

I have pored over long series in the hope of finding absolute distinctions in the development of certain spots or in the conformation of the macular band as a whole which might serve for the construction of a simple key, but it has been a vain hope. Certain tendencies are distinctive, but a tendency can be shown only by an adequate series. The variation within species in this genus is so great that occasional specimens show unusual development even of normally distinctive characters, and so when they stand alone they may easily be confused with the wrong species.

For these reasons the following key will not separate with absolute certainty every specimen that may be collected. To make it as dependable as possible I have separated some species and forms by two procedures, but I seriously doubt that any key, even with such expedients, can be made to identify every specimen accurately. After examining thousands of these insects I still have difficulty in placing occasional isolated individuals. With reasonably long series and data on location, date and altitude the key should enable anyone to arrange his collection satisfactorily, but only if he supplements it with keen and careful observation and good judgment.

KEY TO THE SPECIES OF *HESPERIA*

1. Under side of secondaries with a transverse row of spots, sharply defined and contrasting with the ground color.....2
 Under side of secondaries without such spots. Immaculate or with vaguely defined or scarcely contrasting spots.....59
2. Under surface of secondaries brick red to red-brown, spots well developed, cream to buff.....*leonardus* p. 38
 Under surface otherwise.....3
3. Under side of secondaries with the anal area tawny, this shade usually extending some distance along outer margin. Entire area cut by dark veins. Spots large and white. Asiatic.....*dimila* p. 34
 Under side otherwise.....4
4. Ground color of under surface of secondaries mottled: greenish or ochreous with blackish patches. Veins white, causing the white spots to appear sharply produced along the veins toward the outer margin. (This character is lacking in two specimens of *uncas* from Verdi, Nevada, in the American Museum).....5
 Ground color more uniform and veins not white.....8
5. Moderately dark to very dark insects.....6
 Broadly yellow-fulvous above and very pale below.....7

6. Fulvous of upper surface average, not especially extensive nor very pale, and not unusually diffuse. Stigma normally broad. North Africa.....*benuncas* p. 14
Fulvous of upper surface usually colder in shade and diffused into marginal fuscous areas. Stigma usually very slender. Females much darker than males, often chiefly fuscous with very pale spots. Western half of North America.....*uncas* p. 13
7. A large species, broadly pale yellow-fulvous in both sexes. Under surface very pale and bright but showing the same pattern as *uncas*. Western North America
uncas form *lasus* p. 14
Size moderate. Under surface mostly ochreous, showing faintly the characteristics of *benuncas*. Asia Minor.....*benuncas* form *pallida* p. 15
8. Very dark above and below, often quite blackish. Pale areas of super surface rarely more than a slight diffuse extension of the discal spots of a cold to moderate fulvous shade, contrasting strongly with the very dark ground color.....*metea* p. 15
Never so dark. Very dark specimens of some species included here have the spots of the upper surface also of a darker and warmer fulvous, more reddish than tawny, or the under surface of the secondaries with abundant pale overscaling.....9
9. Spots on under surface of secondaries usually moderate to large, often angular, often confluent, pure white and sometimes with a silky luster, to brightly contrasting yellowish or brownish white. Even when reduced to a minimum, the spots remain conspicuously pale, not diffusing into the ground color.....10
Spots never large, angular or confluent and pure white. If large, then distinctly dull yellow in color. In most species small, separate, and often rounded.....44
10. Under surface very dark, in some specimens with the dark ground color partly concealed by light over-scaling. In such specimens the dark ground color is more evident on the disk.....11
Ground color of under surface not apparently very dark, the light overscaling general and the ground color only moderately dark when evident. Worn specimens may be difficult to distinguish on this basis. Very dark specimens, if fresh, may be placed here by the uniform overscaling of the under surface although it may be sparse.....16
11. Western Species, Arizona to British Columbia, not ranging east as far as the Dakotas.12
Eastern and central species, Labrador to Florida, not ranging west of Minnesota.....15
12. Under surface of secondaries chocolate brown with a very smooth appearance, overscaling unusual and when present rather smooth. Spots behind M_3 often reduced or absent, while those nearer the costa remain large. California, taken so far only at low altitude near Santa Cruz.....*dodgei* p. 29
Under surface of secondaries brownish black, frequently with gray-green overscaling of rather shaggy appearance. Spots otherwise.....10
13. A mountain species. B. C. to mountains of Colorado and Arizona. Spots tending to form a continuous band even when reduced.....14
Texas to Arizona. Spots of under surface usually reduced in size, rounded and widely separated.....*woodgatei* p. 35
14. Under surface dark, often blackish, but sometimes so heavily overscaled with green or greenish scales as to appear pale in fresh specimens. Fulvous evident along costa and in cell but usually not in remainder of pale areas. Macular band of secondaries silky white sharply angled and often shortened by reduction of caudal spot and reduction or loss of anterior spot, even when the neighboring spots are large. From sub-alpine or alpine zone, definitely known only from Colorado at present. Late June to (rarely) late August.....*colorado* p. 22
Under surface with the ground color dark but rarely blackish if ever; overscaling usually golden, rarely greenish; fulvous extending more broadly over the discal portion of the wing; macular band rarely reduced in length without general reduction in size of spots. From lower altitudes, B. C. and Alta. to Ariz., mid-July to mid-September
manitoba p. 20
15. Labrador to Maine and west into Minnesota. Under surface of secondaries usually heavily overscaled with golden or greenish. Occasional dark specimens have spots

- reduced and contrastingly white. Under surface of primaries with conspicuous fulvous areas. *laurentina* p. 19
- Florida. Under surface of secondaries usually dark with greatly reduced and poorly defined spots. Under side of primaries dark with scarcely a trace of fulvous
attalus form *seminole* p. 41
16. A rather small California species, male 26-29 mm. Female 30-34 mm. Under surface of secondaries excepting anal area evenly overscaled with ochre-yellow or greenish-ochre scales. Spots white. One anterior to M_1 in females, usually reduced or absent in males, those behind this vein forming a straight row and sometimes fusing in an oblique band *columbia* p. 31
- Size larger, macular band more uniformly developed, or both. 17
17. Upper surface broadly yellow-fulvous with narrow dark margins. Under surface with the dark margins conspicuously lightened by whitish or greenish overscaling, fringes cut by conspicuous dark points at ends of veins. Spots confluent, usually only whitish in males but white in females, extending conspicuously in sharp dashes along the veins. A far western species. *lindseyi* p. 29
- Different in most of these points. Spots may be outwardly angulate but are not conspicuously extended and there is no suggestion of pale veins elsewhere. 18
18. Variable and widely distributed Eurasian species. Overscaling of under surface ochreous to green; spots well developed and usually pure white. Fringes pale, usually whitish at least terminally. 19
- North American species, some of them very closely resembling Eurasian insects and not dependably distinguishable in individual cases by superficial characters. Genitalia adequate for separation. 20
19. An Asiatic species. Spots on under surface of secondaries tending to be slightly rounded and vague in outline, often distinctly separated by broadly dark veins. *mixta* p. 46
- A European species. Spots on under surface tending to somewhat crescentic, and with very little tendency, even when reduced in size, to appear as separate rounded dots
comma p. 17
20. Overscaling of under surface gray with a variably greenish cast. Spot behind Cu_2 of secondaries set entirely basad of the rest of the row, or if included in the row extending so conspicuously basad that the row appears very irregular. 21
- Overscaling various. Spot behind Cu_2 never so far basad as to disturb the continuity of the row, although it may extend slightly beyond the others and may be isolated if the spots are very small. 22
21. Smaller: male 26-31 mm. Female 31-34 mm. General appearance dark and diffuse. Under surface dark in spite of greenish gray overscaling. Row of spots normally very irregular. *nevada* p. 33
- Larger: male 28-35 mm. Female 32-39 mm. General appearance bright and clean-cut. Fulvous of upper surface pale, extensive, rather sharply defined, and tending to cut through to outer margin of primaries in sharp dashes especially in the female. Overscaling of under surface usually bright pale greenish, varying to pale gray. All spots present and usually very large. *juba* p. 32
22. Overscaling bright green to pale ochreous, the green apparently fading in older specimens. Spot behind Cu_2 set nearer to outer margin than the others, so that the band is nearer to the outer margin at this end, or is outwardly concave. *viridis* p. 36
- Overscaling various. Macular band normal, not curving outward at caudal end. 23
23. Brightly colored, with extensive fulvous areas above. Overscaling normally light ochreous. Spots reduced in size, often with dark outlines due to absence of overscaling. Spots tend to be rounded basad and concave outwardly, making them appear separate even when they are not more so than usual
pahaska form *williamsi* p. 38
- Overscaling variable, darker or of a different color. Spots tending to form a continuous band even when reduced. Separate only in very dark specimens with restricted fulvous maculation above. 24

24. Eastern: Labrador to Maine and west to Minnesota. Dark insects with restricted warm fulvous markings above. 25
 Western: Manitoba, Black Hills of South Dakota to Arizona, West to the Pacific Coast. 26
25. Overscaling of under surface usually greenish. Spots tending to form a complete band, when small, merely shortened and not tending to become rounded and separate. Often followed by dark border without overscaling. Labrador. *borealis* p. 19
 Overscaling golden, rarely slightly greenish. Spots tending to be rounded and separate, and without dark outer border. Gaspé to Maine, west into Minnesota *laurentina* p. 19
26. Males. 27
 Females. 35
27. With clean-cut white spots on under surface, brightly contrasting. 28
 Spots not snowy or silky white. If too conspicuous and pale to have been diverted to the second category under 1, they are at least brownish or yellowish white or poorly defined. 32
28. Overscaling of under surface ochreous, rarely tinged greenish; usually so heavy that this color appears to be the ground color in fresh specimens. This surface with little or no suggestion of fuscous areas on the primaries. 29
 Overscaling rarely so heavy, typically more or less green, although sometimes gray. Darker insects, with definitely fuscous areas below. 31
29. Large. Fulvous of upper surface pale, bright and sharply defined, not diffuse at the margins. *juba* p. 32
 Moderate. Margins of fulvous area diffuse. 30
30. Ochreous overscaling rather deep and rich, often slightly mottled with dark areas due to variability in covering of ochre scales. San Diego Co., Cal., Lower Cal., extending into Arizona and presumably other adjoining areas. *harpalus* form *leussleri* p. 27
 Ochre paler, brighter and more uniform. Spots very sharply defined and clear, white, often with a silky luster. *harpalus* form *idaho* p. 25
31. From high altitudes in Colorado. Dark insects. Overscaling often a decided green. Spot behind Cu_2 of secondaries extending farther basad than the remainder *colorado* p. 22
 Moderate to low altitudes, Montana to Mexico. Overscaling more grayish. Spot behind Cu_2 of secondaries with its inner margin cut off obliquely, its base rarely showing a sharp point and then not extending farther basad than the others. As a result the band more nearly resembles that of *viridis* but it is not outwardly concave *pahaska* p. 37
32. Pale insects, both above and below. Fuscous of upper surface somewhat grayish, due to the presence of many tawny scales. Under surface usually with a decided greenish tinge, though occasionally pale ochreous. Found chiefly in Manitoba *harpalus* form *assiniboia* p. 26
 Otherwise. Dark insects or with the under surface broadly ochreous, the discal reddish tinge of the primaries scarcely evident. 33
33. Small and dark. Spots of under surface very variable and overscaling ochreous, greenish or golden brown. So far taken only on the Olympic Peninsula and Orcas Island, Washington. *hulbirti* p. 21
 Upper surface normal to pale. Under surface ochreous, usually rather uniform. 34
34. Under surface smoothly ochreous. Spots on secondaries not white; often scarcely lighter than ground color. Intergrades with the following form. Occurs at moderate altitudes in Colorado. *harpalus* form *ochracea* p. 28
 Under surface usually mottled ochreous. Spots on secondaries usually white or at least very pale. San Diego Co., Cal., extending into adjoining states and apparently intergrading with *ochracea*. *harpalus* form *leussleri* p. 27
35. Spot behind Cu_2 on under surface of secondaries never nearer the outer margin than the two in front of it, although occasional specimens show a diffuse extension of this spot toward the outer margin in the anal area. 36

- This spot characteristically nearer the outer margin, the row after concave outwardly, as in the male. Females of this species are often distinguished with difficulty from *pahaska* (q.v.).....*viridis* p. 36
36. Overscaling of the under surface ranging from pale whitish gray to a decided green. Rarely tinged yellowish and then of a cold tone.....37
- Overscaling ochreous, rarely slightly greenish in cast.....41
37. Fulvous of upper surface normally very extensive, clear and bright, with sharply defined margins. Overscaling of under surface pale, varying from greenish gray to decidedly green.....*juba* p. 32
- Fulvous normally contracted, showing a complete extradiscal row of spots separate from the discal fulvous area. Otherwise very diffuse.....38
38. Dark insects. Very rarely with discal fulvous of upper surface of primaries extending to include the extradiscal spots. Ground color of under surface dark.....39
- Much paler insects. The fuscous areas more grayish, the discal fulvous more often embracing the extradiscal spots. Under surface especially very pale in comparison.....40
39. Band on under surface of secondaries tending to be reduced by absence of the spot between Sc and R and by the great reduction or absence of that behind Cu₂. Often forming an acute V. (From high altitudes in Colorado).....*colorado* p. 22
- Spots on under surface of secondaries usually large and all present. Forming a much less acute V, often a right angle or slightly less. Known thus far only from the Olympic Peninsula and Orcas Island, Washington.....*hulbirti* p. 21
40. Overscaling of under surface pale grayish, sometimes faintly tinged greenish or yellowish. Spots well developed, often silky. Oregon to Colorado, east to the Black Hills of South Dakota. At moderate altitudes. Intergrades with the following
harpalus form *idaho* p. 25
- Overscaling grayish often slightly shaggy in appearance, frequently tinged with green. Macular band reduced, varying from total absence through all intermediates to a complete row of moderate spots. Frequently irregular, with spots of very different sizes. Centering in Manitoba. Intergrades with *idaho*
harpalus form *assiniboia* p. 26
41. On under surface of secondaries the spot behind Cu₂ projects basad farther than those in front. Posterior limb of V farther from outer margin at this end.....42
- This spot normally even with the remainder of the row. If basally pointed, not extending conspicuously farther basad than the other spots. Band therefore even and not strikingly farther from outer margin at this end.....*pahaska* p. 37
42. A Colorado form from moderate altitudes. Band on under side of secondaries tending to be shortened as in typical *colorado* by great reduction of spots before R and behind Cu₂. Generally, paler than typical *colorado* and with ochreous overscaling below, sometimes slightly green-tinged.....*harpalus* form *ochracea* p. 28
- California, east into Colorado. Upper surface usually with broadly diffuse fulvous, occasional specimens with extradiscal spots distinct.....43
43. San Diego Co., Cal., extending into Lower California and apparently eastward into Colorado. Macular band of under surface usually well developed
harpalus form *leussleri* p. 27
- Yosemite area of California. Macular band reduced, very slender to moderately developed.....*harpalus* p. 24
44. Spots moderate to large, forming a well-developed band, in some cases scarcely contrasting with remainder of wing.....45
- Spots never large, although often sharply contrasting. Sometimes mere points.....47
45. Western, chiefly Oregon and California. Under surface with a peculiar streaked appearance due to dark dashes at tips of veins and sometimes to pale marks on veins
lindseyi p. 29
- Eastern and central.....46

46. Moderately dark. Fulvous of upper surface moderately extensive. Under surface generally yellowish, in more contrasting specimens more brownish or grayish than the yellow spots. *sassacus* p. 47
 A very dark form. Extradiscal spots of upper surface traceable, although sometimes blending into discal fulvous. Under surface in more striking contrast with the yellow spots. *sassacus* form *manitoboides* p. 48
47. Spots small, usually only diffuse dots. Rarely dark on a light ground instead of pale. Behind R in a straight line. Spot behind Cu₂ often lacking. 48
 Spots of the type found in the better-marked species, somewhat angular on close inspection and with the spot behind Cu₂ extended basad if present. 56
48. Males. 49
 Females. 54
49. Long anterior bar of stigma slender, clean cut, diverging from cubital stem in its basal half. Stigma meeting vein A more than $\frac{1}{2}$ from base of wing. 50
 Anterior bar thicker and evidently applied to cubital stem throughout its length. Stigma meeting vein A $\frac{1}{2}$ from base of wing. 51
50. With normally extended fulvous above. Lower surface light. Secondaries with generally ochreous overscaling. *attalus* p. 40
 Very dark. Light color above and below very pale tawny, limited to extradiscal row of spots and mark in cell. *attalus* form *seminole* p. 41
51. Upper surface varying from tawny with a very limited outer fuscous border to fuscous with only the usual limited tawny markings. Under surface yellow to ochreous. 52
 Very dark. Extra discal spots alone paler. *pawnee* form *montana* p. 45
52. Genitalia with a large preapical tooth on the valves. Flies in June and July. Indistinguishable from the following save by these characteristics or by association with female specimens. 53
 Preapical tooth of valves not developed. Flies in August and September. *pawnee* p. 43
53. Tawny above with only a faint indication of the usual dark areas. Fuscous no more than a slender terminal line. *ottoe* p. 42
 With normally extensive fuscous areas above. *ottoe* form *ogallala* p. 42
54. Upper surface with diffuse fulvous areas, the spots of the secondaries extending in limited points or long streaks on both sides of the dark veins. Flies in June and July. *ottoe* form *ogallala* p. 42
 Upper surface very dark, the spots of the primaries mostly clean-cut and whitish although those of the secondaries may be quite diffuse. 55
55. Usually dark but with a conspicuous sprinkling of fulvous scales at least near base of primaries. Spots of primaries almost white except that between Cu₂ and A. Very dark specimens difficult to distinguish from *attalus*. *pawnee* p. 43
 Blackish insects with scattered fulvous scales. Spots of primaries pale, but all spots show a tinge of fuscous. *attalus* p. 40
56. Overscaling of under surface usually rather pale and bright, varying from light gray in some females to yellowish or greenish gray. In males commonly pale greenish to yellowish or ochreous. Some specimens difficult to separate from next category, but in a series the colder shades and greenish overscaling, with extreme variation of spots below, are characteristic. *harpalus* form *assiniboia* p. 26
 Ochreous below, varying from faded whitish ochreous to a rich warm shade. Only males normally key here; females have the spots of the under surface well developed except in rare individuals. 57
57. Normally a rich warm ochreous below. 58
 Normally small and with a faded appearance below, spots greatly reduced and inconspicuous. Yosemite district of California. Intergrades with *leussleri* *harpalus* p. 24
58. Moderate size. Under surface of secondaries with some mottling of clear and dull ochreous. Typical specimens key elsewhere because of contrasting whitish spots, but

- the form intergrades with *harpalus* and *ochracea*. San Diego Co., Cal., and neighboring areas.....*harpalus* form *leussleri* p. 27
- Typically a larger insect with the whole under surface a rather uniform bright ochreous. Spots not white even when well developed, often scarcely contrasting. Colorado, moderate altitude.....*harpalus* form *ochracea* p. 28
59. Dull blackish with little suggestion of fulvous. Species usually has contrasting white spots below even when they are greatly reduced, but a few immaculate specimens from Texas have been seen.....*metea* p. 15
- Not such insects.....60
60. Secondaries immaculate below. Spots sharply defined or contrasting in these species when present so that spotted examples key out elsewhere.....61
- Under surface of secondaries with a vague light band or a series of distinguishable spots only slightly paler than ground color or with diffuse margins.....72
61. Terminal half of fringes of secondaries as seen from above whitish, contrasting.....62
- Terminal half tinged with fulvous or grayish and not clean cut.....69
62. Stigma of male in contrast with cubital stem only along anterior half of anterior bar, meeting anal vein more than one third from base. Upper surface of female blackish with a very scanty sprinkling of fulvous scales and spots tinged fulvous...*attalus* p. 40
- Anterior bar of stigma more closely applied to cubital stem. Stigma meets anal vein one third from base. Females with a much more evident fulvous overscaling or with spots of primaries almost entirely white.....63
63. Under surface of secondaries with gray to grayish green overscaling in the female, in males more ochreous but usually with a greenish or grayish tinge. Male rarely exceeding 30 mm. in expanse.....*harpalus* form *assiniboia* p. 26
- Under surface clear smooth ochreous or yellowish. Expanse of males rarely as little as 30 mm. except in very dark specimens.....64
64. Dark, with restricted fulvous maculation. Western.....*pawnee* form *montana* p. 45
- Much brighter yellow-fulvous in the pale areas. Plains and prairies of the middle west.....65
65. Males.....66
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66. Almost entirely yellow fulvous above excepting stigma and a narrow terminal fuscous line. Valve of genitalia with a prominent preapical tooth. Flies in June and July. Extremely pale specimens of *pawnee* are indistinguishable except by season or genitalia.....*otloe* p. 42
- Yellow-fulvous restricted to discal area and extradiscal spots.....67
67. Valve with preapical tooth. Season of flight June and July...*otloe* form *ogallala* p. 42
- Valve without preapical tooth. Season of flight August and September...*pawnee* p. 43
68. Extradiscal spots of primaries mostly clean-cut and whitish.....*pawnee* p. 43
- Markings of wings yellow-fulvous and poorly defined.....*otloe* form *ogallala* p. 42
69. A southern species, ranging from Florida to Texas and north into the Carolinas and Arkansas. Large, dark, with a distinctly rusty tinge below.....*meskei* p. 39
- Western or midwestern and not dark.....70
70. From the prairie states: Manitoba south into Iowa and eastward into Illinois. A pale and vaguely marked species, variable in color and marking above and below but generally smaller and duller than the species *otloe* and *pawnee* found in the same area.....*dacotae* p. 49
- Western: Colorado or California.....71
71. From the Yosemite region of California. A small form, occasionally dull ochreous and immaculate below in the male sex.....*harpalus* p. 24
- From Colorado, moderate altitudes. Moderately large, bright. Under surface ochreous, spots in males not white, though paler than ground color, probably in rare cases sufficiently lacking in contrast to bring the form into this category
harpalus form *ochracea* p. 28

72. Eastern Asia and Japan. A rather dark species with a somewhat reddish cast below but with ochreous to greenish overscaling. Spots of under surface small, rounded and separate, somewhat diffuse and usually not white although in some females they are very pale. *florinda* p. 45
 North American. Under surface never with greenish overscaling. 73
73. Southern, ranging from Florida to Texas and north into the Carolinas and Arkansas. Large, dark, with a distinctly rusty tinge below. Spots on under surface small, vague, sometimes forming a vague transverse band. *meskei* p. 39
 Eastern and mid-western. Moderate to small, grayish or yellowish below, never rusty brown. 74
74. From the prairie states: Manitoba south into Iowa and eastward into Illinois. A pale and vaguely marked species. Under surface of male varying from yellowish to dull grayish ochre, spots normally small and vague. Males are difficult to distinguish from occasional specimens of *sassacus*. Females decidedly grayish below with small vague spots. Upper surface much duller and more vaguely marked than *sassacus*. A rare species. *dacotae* p. 49
 A common eastern species, distribution overlapping with *dacotae* evidently only in Illinois and eastern Iowa. A great majority of specimens easily distinguished by the bright color and strong contrasts of the upper surface and by the large, clean cut, but sometimes not strongly contrasting spots of the under surface. Occasional males are very close to some specimens of *dacotae*. *sassacus* p. 47

1. *Hesperia uncas* Edwards. Pl. I, fig. 1; Pl. III, fig. 1, 2; Pl. IV, fig. 1.

- Hesperia uncas* Edwards, Proc. Ent. Soc. Phil. II, 19, pl. V, fig. 3, 1863. Philadelphia.
 Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 83, 1931.
 Field, Bull. Dept. Ent. U. Kans. No. 12, 243, 1938.
 Macy & Shepard, Butterflies, 209, 1941.
Hesperia ridingsii Reakirt, Proc. Ent. Soc. Phil. VI, 151, 1866. Rocky Mts., Colorado Terr.
Erynnis uncas Seudder, Butt. E. U. S. III, p. 1862, 1889.
 Holland, Butterfly Book 349, pl. XLVII, fig. 27, 28, 1898.
 Draudt, Seitz's Macrolep. V, 930, pl. 180k, 1924.
 Holland, Butterfly Book, Rev. Ed. 375, pl. XLVII, fig. 27, 28, 1931.

Uncas is among the easily recognized species of the genus, yet even it produces an occasional puzzling specimen. On the upper surface the male is characterized by the tawny fulvous areas, much colder in shade than the more reddish species, and by the broad diffusion of these areas into the fuscous margins. Even darker specimens with this color restricted to the discal area and the transverse row of spots on the primaries show it broadly diffused on the secondaries, with the paler band of spots in moderate contrast. The fringes have the terminal half white or whitish. The stigma is very slender.

The female differs from the male in the great restriction of fulvous. The upper surface is frequently fuscous with the spots at the end of the cell and those of the transverse band largely white, though sometimes slightly tinged with fulvous. These wings may show a faint fulvous overscaling. The secondaries commonly have a little more diffuse fulvous on the disc, in which the row of spots is paler fulvous.

From these ordinary conditions *uncas* varies toward the extremely pale *lasus*, presumably only a form. Specimens with extreme extension of the fulvous areas of the upper surface cannot be placed with absolute accuracy.

On the under surface the white veins, causing the spots to appear drawn out at their angles, are usually distinctive. The general color is ochreous to greenish, with some fuscous patches in the cell and before and beyond part of the white spots. Females resemble males but are generally darker.

Two males from Verdi, Nevada, sent to me from the American Museum by E. L. Bell, were the most remarkable variants observed. They were very pale above, but with the same smoothly blending appearance and pale spots that typical *uncas* shows. The spots below were unusually large and in one specimen the dark blotches were also at a minimum. The specimens were so different in appearance from normal *uncas* that both of us regarded them as an undescribed species, not even relating them to *uncas*, until some happy circumstance led to a comparison with more ordinary representatives of the species.

Expanse: male, 26-33 mm.; female, 27-37 mm.

Distribution: The type locality, Philadelphia, seems highly improbable, since the species is abundant in semiarid regions of the west. I have found it common at Almont, Colorado, near 8000 ft., in sage brush areas. Authentic records include Manitoba and Medicine Hat, Alberta, on the north, Pierre and Sturgis, S. D., on the east, and numerous localities in Montana, Colorado, New Mexico and Kansas. The insect flies from the end of June until after the middle of August.

1a. form *lasus* Edwards.

Pamphila lasus Edwards, Papilo IV, 54, 1884. Southern Arizona.

Hesperia uncas form *lasus*, Lindsey, Bell & Williams, Denison U., Bull., Jn. Sci. Lab. XXVI, 84, 1931.

Erynnis lasus Holland, Butterfly Book, Rev. Ed., 375, pl. LXXII, fig. 15, 16, 17, 1931.

This form, or possibly species, was known only from the type for many years. In 1922 E. P. Van Duzee collected a few specimens early in July near Salt Lake, and Tom Spalding sent Dr. William Barnes a good series from elsewhere in Utah. It is a larger and paler insect than typical *uncas*, with all of the lighter markings developed to an extreme degree.

Holland's figures are very good. The specimens from which they were made were part of Dr. Barnes series collected by Spalding. I have been unable to secure specimens since that time, and have not examined the genitalia.

2. *Hesperia benuncas* Oberthür. Pl. I, fig. 2; Pl. IV, fig. 8.

Augiades benuncas Oberthür, Bull. Soc. Ent. France 1912, 349. Lambèse.

Bang-Haas, Nov. Mac. 99, 1926.

Erynnis comma var. *benuncas* Reverdin, Bull. Soc. Léop. Genève III (4) 196, pl. 9, fig. 11, 1917.

The resemblance to *uncas* suggested by the name of this species is due chiefly to the fact that the veins on the under surface of the secondaries are white. The greenish overscaling of this surface is rather more uniform than that of *uncas*, but some dark blotches appear. On the upper surface the fulvous areas are of

average shade and are not especially diffuse. Neither is the stigma of the male unusually slender.

Expanse: male, 29–32 mm; female 30–32 mm.

Distribution: My series of nine males includes six that are topotypical, coming from the vicinity of Lambèse in Algeria. Most of them were taken by Harold Powell in July, 1913. Two are from Bel Achir, Algeria, and one bears a Staudinger label that is very probably erroneous. I have also examined in the British Museum material sent by Brigadier Evans some specimens from Algeria and Morocco, the latter partly from the Middle Atlas Mts., that resemble my own series closely. Two other pairs labelled Middle Atlas Mts., 6500 ft., Sept., are very dark and contrasty, but otherwise agree with the above description.

2a. form pallida Staudinger. Pl. VI, fig. 19.

Augiades comma var. *pallida* Staudinger, Cat. 3rd ed., 92, 1901.

Erynnis comma var. *pallida* Reverdin, Bull. Soc. Léop. Genève. III, 196, 1917.

Urbicula pallida Verity, Bull. Soc. Ent. France 1928, 127.

The meager bibliography that I have been able to consult on this form leaves me in some doubt as to its identity. It has been treated as a form of *comma*, but the same may be said of almost every other palaearctic species, hence the treatment does nothing to relieve my uncertainty. A series of thirteen males and three females in my collection, mostly from Zeitun (Zeytin?), Turkey are very pale both above and below. On the upper surface the fulvous areas are extensive. The lower surface has an ochreous background, in some cases with reduced and merely whitish spots. The whitish veins and the structure of the genitalia place this group unmistakably with *benuncas*. Moderately pale specimens in the series agree closely with a pair from the British Museum labelled *pallida*; this pair was collected in the Hills near Yozgat, in central Turkey, 5000 ft., July–September, 1918, by Capt. W. W. Phillips. One of my own specimens extends the range to Zahle, in southern Syria, August 28, 1932. The females of this form are considerably darker than the males. The transverse row of spots is entirely evident above on both wings, whitish on the primaries and tawny on the secondaries, although there is a well marked fulvous suffusion of the ground color. Below, the ground color is somewhat brownish in part.

Another pair from the British Museum, labelled Syria, are evidently not the same species. I have noted that they resemble pale *comma* but that the female has an unusually broad macular band below; also that discoloration of the specimens may heighten the effect of difference from the others sent as *pallida*.

3. *Hesperia metea* Scudder. Pl. I, fig. 3; Pl. III, fig. 8, 15; Pl. VI, fig. 7, 14, 21.

Hesperia metea Scudder, Proc. Essex Inst. III, 177, 1862, Connecticut.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 84, 1931.

Macy & Shepard, Butterflies, 211, 1941.

Pamphila licinus Edwards, Trans. Amn. Ent. Soc. III, 275, 1871, near Waco, Texas.

Erynnis metea Scudder, Butt. E. U. S. II, p. 1650, 1889.

Holland, Butterfly Book, 348, pl. XLVII, fig. 33, 34, 1898.

Draudt, Seitz's Macrolep. V, 930, pl. 180i, 1924.

Holland, Butterfly Book, Rev. Ed. 375, pl. XLVII, fig. 33, 34, 1931.

Erynnis licinus Holland, Butterfly Book, Rev. Ed. 374, pl. LII, fig. 28 (type), 1931.

Metea is distinguished by the very dark color, only the brightest males showing a fairly extensive diffusion of fulvous beyond the discal spots. Females are often wholly blackish, with only a slightly tawny tinge in the spots of the secondaries when they are present.

On the under surface the prevailing color is fuscous with white spots, although paler males show a little fulvous in the cell of the primaries and enough pale overscaling to render the dark areas brownish in appearance or to break them up into light and dark patches. This condition, together with the extension of the spots in thin lines along the veins, makes the lightest males rather like dark males of *uncas* in appearance, but this resemblance is noteworthy only in extreme cases. The band is usually continuous, with the angle extended sharply toward the outer margin. The fringes may be pale-tipped, but the tips are not white or whitish as in *uncas*.

Females are usually much darker on both surfaces, with a vaguely shaggy appearance. The white spots of the secondaries tend to disappear, leaving a few at the costal end of the band on the under surface and a reduced indication of this remainder, with a tawny tinge, above. Very dark specimens are more often southern, and the brightest, with a full complement of spots and some light overscaling below, are usually northern.

Expanse: male 24-30 mm.; female, 29-36 mm.

Distribution: The species has been recorded from Southern Maine to Alabama and west into Texas. Holland lists Wisconsin, Missouri and Florida. Macy and Shepard include central Michigan, and I have examined one male in the collection of J.W. Tilden from Logan County, Oklahoma, April 28, 1939.

H. A. Freeman has sent me for identification one male and three females from Dallas County, Texas, which are quite the darkest that I have seen. Two females were sooty black with only the preapical spots and a trace of the anterior extradiscal spots. The other was almost immaculate, showing only faint traces of the more anterior spots of each wing on the under surface. The male was dark, but lighter than the females as usual. One female bore the date, March 31; the other specimens were taken in early April.

The species flies throughout April in the southern part of its range and a month later in the northern parts.

The possibility that the unique type of *horus* is one of these dark specimens of *metea* seems wholly dispelled by a letter from Mr. Nathan Banks, who has very kindly compared the type with females of other species in the museum at Cambridge, at my request. His comments strengthen my feeling that *horus* belongs to another genus.

The type of *licinus* is a normal specimen of *metea*. The upper surface, illustrated by Holland, is less distinctive than the lower.

4. *Hesperia comma* Linnaeus. Pl. I, fig. 4, 5; Pl. IV, fig. 15.

Papilio plebeius urbicola comma Linnaeus, Syst. Ed., X ed., 484, 1758.

— *catena* Heydenreich, Lep. Eur. 18, 1851.

Hesperia comma var. *alpina* Bath, Entomologist XXIX, 21, 1896.

— *comma* ab. *faunula* Oberthür, Et. Ent. XX, 1896.

— ab. *guernisaci* Oberthür, Et. Ent. XX, 1896.

— var. *flava* Tutt, Brit. Butt. 129, 1896 (fide Tutt) Tutt, Brit. Butt. 158, 1906.

Urbicola comma Tutt, Brit. Butt. 153, 1906.

Urbicola comma ab. *clara* Tutt, Brit. Butt. 156, 1906.

Urbicola comma ab. *intermedia* Tutt, Brit. Butt. 156, 1906.

Urbicola comma ab. *suffusa* Tutt, Brit. Butt. 156, 1906.

Urbicola comma ab. *pallidapuncta* Tutt, Brit. Butt. 156, 1906.

Urbicola comma ab. *extrema* Tutt, Brit. Butt. 156, 1906.

Urbicola comma ab. *juncta* Tutt, Brit. Butt. 157, 1906.

Urbicola comma ab. *centripuncta* Tutt, Brit. Butt. 157, 1906.

Urbicola comma ab. *confusa* Tutt, Brit. Butt. 157, 1906.

— *comma* ab. *dupuyi* Oberthür, Et. Lép. Comp. IV, 360, pl. 37, fig. 240, 1910. Angoulême.

— ab. *albescens* Oberthür, Et. Lép. Comp. IV, 361, pl. 37, fig. 241, 1910. England.

Erynnis comma var. *apennina* Rostagno, Soc. Zool. Ital. 1911, p. 72 (fide Verity & Querci.)

Erynnis comma form *mizloapennina* Rostagno, Bull. Soc. Zool. Ital. (2) XII, 12. Near Rome (date?).

Reverdin, Bull. Soc. Lép. Genève III, 206, 1917.

Erynnis comma Reverdin, Bull. Soc. Lép. Genève III (4), 193, 1917.

— *oberthüri* Verity, Ent. Rec. XXXI, 27, 1919. Sicily.

— race *orace* Verity, Ent. Rec. XXXVI, 107, 1924.

Urbicola comma race *aurata* Verity, Ent. Rec. XXXVI, 107, 1924.

— *barcaeus* Turati, Atti Soc. Ital. XLIII, 37, pl. 1, fig. 20-21, 1924. Cyrenaika.

— ab. *immaculata* Fernandez, Bol. Soc. Ent. Esp. Zaragoza I, 158. Spain.

Urbicola comma race *galliaemeridiei* Verity, Bull. Soc. Ent. France 1928, 124. Nimes, Gedre (Hautes-Pyrenees).

Urbicola comma race *hibera* Verity, Bull. Soc. Ent. France 1928, 125. Spain and Portugal.

Urbicola comma race *macrocomma* Verity, Bull. Soc. Ent. France 1928, 126.

Urbicola comma race *alpapennina* Verity, Bull. Soc. Ent. France 1928, 125. Sibilline Mts.

Urbicola comma race *alpiumflava* Verity, Bull. Soc. Ent. France 1928, 126. Tyrol.

Urbicola comma race *superalpina* Verity, Bull. Soc. Ent. France 1928, 127. Rhetian Alps.

Urbicola comma race *atralpina* Verity, Bull. Soc. Ent. France 1928, 127. 2300 m., above Stelvio, etc.

The above bibliography, although it has been written only to include references to original descriptions of subspecific categories and a few of the more useful subsequent discussions, is ample testimony to the abundant splitting of this common European species. It would be folly to attempt an analytical discussion of the many named varieties, forms, races, and aberrations here. When I consider the variability of our own western species which, like *comma* in Europe, range from cold to warm climates, from high to low altitudes, and from moist to arid regions, the futility of naming minor variations seems evident. There must be no beginning or there can be no end.

It is difficult for an outsider to judge what should be regarded as typical *comma* in this vast assemblage. I base the following description chiefly on an excellent series from England, supplemented by thirty specimens from various parts of

Europe, chiefly Bohemia, Italy and Switzerland. In addition I have notes on representative specimens from the British Museum series from Lapland and Norway under the name *catena*, and from Spain, Portugal, France, Britain, Italy, Germany and Poland under the name *comma*. Evidently the museum has not split its series as freely as some of the specialists cited above have done.

Average specimens of *comma* have the fulvous areas of the upper surface moderately deep, neither dark and reddish nor pale and tawny. The fuscous borders are broad, leaving the transverse rows of spots distinctly marked toward the costa of the primaries. These spots may be paler at the same extremity but they are not whitish. Elsewhere on both wings they are usually in an area of fulvous suffusion. The fringes are contrastingly pale, usually whitish. Females differ from males as indicated in the general description. Darker specimens of both sexes occur in which the fulvous is somewhat deeper in shade and more restricted. I have one female from Pontresina, 6000 ft., which is almost wholly fuscous, with sharply defined spots appearing pale by contrast.

On the under surface both sexes have the heavy overscaling of a greenish shade, varying from a rather bright green to more ochreous. The male of *catena* Stgr. shows some mottling with dark shades, reminiscent of *harpalus leussleri* of the North American fauna. The spots are usually moderate to large, white, and at least fairly sharp in outline. The spot behind Cu_2 of the secondaries is set sharply basad of the rest, sometimes losing contact with the next. When reduced, the spots are sometimes tinged with tawny. The outer margin is frequently marked with a fine black line, often heaviest around the anal angle of each wing, and the fringes have conspicuous black dots at the ends of the veins. The outer half of the fringes is usually pale enough to appear whitish.

Expanse: male, 27-32 mm.; female 28-35 mm.

Distribution: Lapland to Sicily, Britain to Turkey. Strangely enough it is not known from Scotland, Ireland and Wales.

Reported Asiatic distribution is uncertain, since several Asiatic species have been listed as forms of *comma*. In view of the vertical distribution from the low levels of Britain to over 5000 ft. in Switzerland, it surprises me to find all dates in my series from the latter part of July and the first half of August. According to Tutt these months are the usual season for the insect, although he gives continental European records from late May to the middle of September.

Many North American species have been listed as forms of *comma*, but I doubt that the association can be maintained. In comparing with our species, I find no reason whatever for associating *colorado* and the similar species and forms with *comma*. The European insect is closest in superficial appearance to that found in Labrador, which was regarded by some of the early lepidopterists as true *comma*. I have compared my Labrador specimens carefully with all of my European *comma* in order to form an opinion on this point, and have failed to find wholly dependable distinctions in the wings, but the genitalia differ. *Comma* is brighter, with a more clean-cut appearance. Its fringes are paler. Dark spots appear in the fringes of the Labrador insect, but the margin of the wings more often lacks the fine, sharp, dark line. At the most there is a trace of a marginal line and it does not become more conspicuous around the anal angles.

5. *Hesperia borealis* n. sp. Pl.I,fig.6; Pl.IV,fig.9,16.

Male: A rather dark insect on the upper surface due to the restriction of the fulvous areas to the usual discal and basal portions of the primaries and to the transverse rows of spots, with some suffusion elsewhere. The fuscous areas are also dark, almost black, in fresh specimens. On the under surface the overscaling is sparse to well developed, of a deep golden or greenish shade. The spots are white and vary from moderate to small. In my series, even when small, they are merely greatly shortened and still form a thin continuous band. The spot behind Cu_2 is offset toward the base of the wing. Expanse 27-29 mm.

Female: On the upper surface the fulvous is moderately deep and is restricted to the spots and, in the palest specimens, to the cell of the primaries and a very limited suffusion basad and on the secondaries. Below, the chief distinction is the large size of the spots. Although variable and sometimes short they are conspicuously larger than those of the males. Expanse 27-31 mm.

In both sexes fresh specimens often show conspicuous black patches following the spots on the secondaries and to a lesser extent preceding them. The fringes are light but not white, and have black dashes at the ends of the veins.

Holotype male and allotype female, Nain, Labrador, July 25 and 26, respectively, 1940. Five male paratypes and five female paratypes, Nain, Labrador, from July 13 to August 7, all in the writer's collection.

This species is superficially quite like *comma* of Europe, but differs in genitalic structure in the much closer relationship of proximal and distal teeth on the valves and in the form of the distal tooth. It may be a form of *laurentina* as noted under that species. For a long time I placed it so, and it shows the same genitalic characteristics, but I am led to separate the two by the tendency of the spots on the under surface to form a continuous band, even when reduced, and by the presence of dark patches after and in some specimens before these spots. These points are quite different from the tendency of the spots in *laurentina* to become separate and rounded even when fairly large, and to be closely bordered by the overscaling.

6. *Hesperia laurentina* Lyman. Pl.I,fig.7; Pl.III,fig.16,17; Pl.IV,fig.3,10.

Pamphila manitoba var. *laurentina* Lyman, Can. Ent. XXIV, 59, 1892.

Hesperia colorado race *laurentina* Macy & Shepard, Butterflies, 210, 1941.

This species has a generally dark upper surface, with rather restricted rich fulvous areas. The palest females known to me show all spots clearly against a dark background, although the basal third of the wings is suffused with fulvous. A few males have the secondaries more broadly suffused.

On the under surface the overscaling of the secondaries and apices of the primaries is of a deep golden shade, rarely with a slight suggestion of greenish. The spots of this surface are white and are usually of moderate size in both sexes, giving the appearance of being slightly rounded and separated.

Expanse: male, 25-31 mm.; female, 28-32 mm.

Distribution: Lyman recorded the insect from several localities in south-eastern Canada. I have a long series taken by Dr. A. E. Brower at Bar Harbor, Maine, a few specimens from other localities in Maine, and a few from Argonne and Kewaunee, Wisconsin. The great majority were taken in August, and a few

in early September. A specimen from Nepigon, Ontario, in the British Museum bears the date July 29, 1893, and a male in the collection of Mr. R. A. Leussler, was taken at Hibbing, Minnesota, August 18, 1930.

This name has been carried as a synonym of *manitoba* for many years, and the insect is indeed similar to *manitoba* in several ways. First, both are dark in color, with rather bright overscaling and white spots below. Second, no conspicuous genitalic differences are to be found between them. Third, both are northern or mountain forms.

I find that the maculation of the under surface of *laurentina* rather generally shows the tendency to separation of the spots even when they are fairly large, and in females as well as males although females more often have large and contiguous spots. All of the male genitalia that I have examined have the proximal tooth of the clasper very strongly developed and curved, far overshadowing the distal tooth. On the basis of these distinctions, and on the facts of distribution as far as they are known to me, I believe that *laurentina* should be regarded as a distinct species. I have no evidence that it runs into the territory of *manitoba* in the west, nor do the more western specimens show a tendency to intergrade with *manitoba*.

The proper relations of *laurentina* and *borealis* are a puzzle. For many years I inclined to the view that our Labrador insect was true *comma*, but it differs in the form of genitalia. Strangely enough, it seems that no name has been given to this form in all the years that it has been known. I have named it here as a species, although fully realizing that my former association of it with *laurentina* may be the proper disposal of it.

7. *Hesperia manitoba* Scudder. Pl.I,fig.8;Pl.IV,fig.17,18.

Pamphila manitoba Scudder, Mem. Bost. Soc. Nat. Hist. II, 351, pl. X, fig. 8-11, pl. XI, fig. 7, 8, 1874, Colorado and Canada.

Erynnis manitoba Holland, Butterfly Book 347, pl. XLVI, fig. 2, 3, 1898.

Holland, Butterfly Book, Rev. Ed., 371. Pl. XLVI, fig. 2, 3, 1931.

Pamphila comma race *manitoba* Barnes and McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Lindsey, U. Ia. Studies in Nat. Hist. IX (4), 70, 1921.

Manitoba is very like *laurentina* above in its depth of color, including both the warmth of the fulvous areas and the extent of the darker parts of the wings. It seems to be a more variable species, however. If this difference is not merely due to chance in my own series of the two species, it may well be a result of the extremely varied conditions that obtain in the mountainous west, in contrast with the less extreme temperature and humidity fluctuations of the range of *laurentina*. Whatever the reason, my series shows variation from extremely dark to comparatively pale specimens. The latter are not common, but I have a few males in which only a moderate fuscous margin persists and the pale spots are almost lost in the fulvous disc, and one female with every fulvous mark pale and extended and even the fuscous areas suffused with pale scales.

On the under surface the overscaling is not conspicuously different from that

of *laurentina* but it has a prevalent tendency to be greenish. The macular band of the secondaries shows the tendencies of *borealis* rather than those of *laurentina*. The spots are usually large, and when reduced they tend merely to shorten, forming a slender band, rather than to become separate and rounded. Occasionally they show slight dark margins. The overscaling varies from sparse to dense, even in fresh specimens, producing correspondingly dark or light wings.

The genitalia do not show the exaggerated proximal tooth of the other species. In *manitoba* this tooth is little, if any, longer than the distal tooth.

Expanse: male, 25–31 mm.; female, 30–36 mm.

Distribution: Scudder described the species from British Columbia and Colorado, noting in his discussion that its season of flight is later than that of *colorado*, although they overlap. McDunnough later indicated that British Columbia must be regarded as the type locality. I have a series from Robson, B.C., collected by H. R. Foxlee at lower levels, although he regards it as more common at higher altitude. These specimens bear dates from July 7 to September 11, chiefly in late August. A series from Lowell Hulbirt, taken at Sunwapta Pass and Banff Alberta, and Logan Pass, Montana, are dated July 15 to 19. My only other specimens, from J. W. Tilden, are labelled Graham Mt., Arizona, July 27, 1933. I have a few notes on other collections that add localities in Oregon and Washington and one in southwestern Colorado, with altitudes near 5000 ft. and dates from late July to late August.

Evidently Scudder's original conclusions were sound. The species seems to fly at lower levels than true *colorado*, and at a generally later season even though there is a conspicuous overlapping here. For a time I felt that it must be united with *colorado*, but the data furnished by Robert Whittaker and discussed under that species are strongly suggestive, if not conclusive evidence that the two are distinct.

8. *Hesperia hulbirti* Lindsey. Pl.I,fig.9; Pl.IV,fig.4,11.

Hesperia hulbirti Lindsey, Ann. Ent. Soc. Am. XXXII (1), 171, 1939. Hurricane Hill, Olympic Mts. Washington.

This species is among the most variable of those whose genitalia afford no striking distinctions, or, in other words, those formerly associated with the European *comma*. And variability in most of these insects is extreme.

Hulbirti is a small species, very dark on the upper surface, with reddish fulvous spots and very dark fuscous areas. Females have less extensive fulvous markings than males, with the exception of the transverse rows of spots, but they are equally dark. Only the preapical and extracellular spots of the primaries are paler, as is usually true in this genus.

On the under surface of the males the overscaling is golden to greenish golden and the spots, never white, are sometimes scarcely paler than the surrounding areas. The spot before the radial of the secondaries is reduced or lacking. The rest of the band varies but is usually broad. Females have a more grayish green

overscaling, sufficiently sparse to give a slightly shaggy effect. The spots are large and white, and the one anterior to R is well developed.

Expanse: Male, 25 to 27 mm.; female, 28 to 31 mm.

Distribution: The large type series was taken on Hurricane Hill in the Olympic Mts. of Washington, July 21, 1938, by Lowell Hulbirt. Later I received a pair from Mr. R. A. Leussler labelled Mt. Constitution, Orcas Island, Washington, August 6, 1923, R. H. Wolcott.

These specimens were slightly brighter and less shaggy than the type series, but were unhesitatingly associated with it. In 1940 another long series was taken by Mr. Hulbirt on July 22 and 23.

From this series he supplied me with several additional specimens of both sexes. I also referred to this species a pair from Brewster, Washington, July 4 and 25, 1939, and a male in the British Museum from Cariboo, B. C.

More abundant material may show intergrading with *manitoba* that would justify regarding *hulbirti* only as a form. Mr. Hulbirt writes that the humid and cloudy weather of the type locality is so prevalent as to make good collecting days rare. Insects developing in such a region might very well differ conspicuously from members of the same species in drier and sunnier lands. On the other hand, there is some question whether the same species would thrive in such diverse regions.

On the basis of the material available, I noted in connection with the original description the following comparison with *manitoba*:

- "1. *Hulbirti* is smaller, *manitoba* males varying from 28 to 33 mm. and females from 31 to 35 mm."
- "2. The spots of the under surface are clear white in both sexes of *manitoba*, contrasting sharply with the over-scaling. Only in males with greatly reduced spots are they faintly tinged with yellow."
- "3. In males of *manitoba* there is a prevailing tendency for the anterior spot of the band on the under side of the secondaries to be very small or altogether lacking, and for the two opposite the cell to be small and irregular. In the female the anterior spot is noticeably small in all but one specimen of the series at hand."
- "4. Although a dark species, *manitoba* is generally paler than *hulbirti*. . . ."

9. *Hesperia colorado* Scudder. Pl.I,fig.10; Pl.IV,fig.5,12.

Pamphila colorado Scudder, Mem. Bost. Soc. Nat. Hist. II, 349, pl. X, fig. 17, 18, pl. XL, fig. 1, 2, 1874. Colorado.

Hesperia colorado Macy & Shepard, Butterflies, 209, 1941.

Pamphila comma race *colorado* Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 126, 1916.

Lindsey, U. Ia. Studies Nat. Hist. IX (4), 70, pl. I, fig. 11, 1921.

Erynnis colorado Holland, Butterfly Book, Rev. Ed., 371, pl. LII, fig. 1, 2, 1931.

This insect has been difficult to place satisfactorily. According to Scudder's original discussion, *colorado* is on the wing earlier than *manitoba*, appearing during

the second week of July and flying until nearly the end of August. His remarks about Mead's explorations imply that the type series came from above 7500 feet. His three colored figures include one (16) that obviously represents *nevada*. McDunnough's report on the types fixed the specimen in the Cambridge Museum from which fig. 18 was made as the true type. This action should be regarded as valid, hence the status of the specimens in the Carnegie Museum which Holland figured as types can be no more than that of paratypes. The figure of the under surface may very well be true *colorado*.

My idea of *colorado* was based on the compared specimen in the Barnes collection, and may be summed up thus: It is a comparatively small and usually very dark species, but the darkness of the upper surface is due chiefly to the restriction of the fulvous areas, which are normally of a much colder shade than those of *manitoba*. Females have the more anterior spots of the primaries conspicuously pale.

On the under surface the overscaling is distinctly greenish in most specimens, making the wing decidedly green when it is abundant. When sparse, it reveals the brownish black ground color so extensively that the wing shows a faintly golden shade over the dark color. The macular band of the secondaries is well developed and silky white, often followed by a dark line free from overscaling. It has a peculiar form typically. The spot costal to R is very small or lacking and that behind Cu_2 is reduced but included in the band. In the male the spots opposite the cell are very short and in the female they extend well out from the cell, both conditions giving the band the form of a V considerably less than 90 degrees. The spots at the base of the wing are also well developed, frequently forming a loop.

Expanse: male, 25-29 mm.; female, 28-33 mm.

Distribution: Such a species flies at high altitudes in Colorado, and is on the wing during the season mentioned by Scudder. It should be regarded as true *colorado*. A series of twenty-nine specimens now before me, collected by Robert Whittaker near Bailey and Grant, on Grey's Peak, and in a few other Colorado localities, nicely illustrates the species. The altitude notations vary from 7800 to 10,500 feet and the dates from June 27 to August 27. Specimens that I have seen in other collections, chiefly that of the Philadelphia Academy of Natural Sciences, are all from Colorado. A series bearing the old Bruce labels at Philadelphia was taken in the first fortnight of July, 1893, from 12,000 to 14,000 feet according to the labels. I am surprised that anything could be caught at 14,000 feet in Colorado Rockies at that season, but so the labels read.

In recent notes on this genus I have associated *idaho*, *harpalus*, *leussleri* and *ochracea* with this species. I lacked satisfactory data on their relations until Mr. Whittaker's material, including also a long series that I associate with *leussleri*, reached me last winter. His shipment was accompanied by careful notes, and he writes his opinion that *leussleri* is not to be regarded as a form, since ordinarily the appearance of the same species at slightly different elevations and seasons is not accompanied by such striking differences. Here there is not even a suggestion of intergradation. I fully concur in this opinion.

Of the four forms mentioned, the first three are obviously related, the fourth less so in its typical form but it seems to intergrade with *leussleri*. *Assiniboia* is also typically quite different, but intergrades with *idaho*. The time-honored assemblage listed as forms of *comma* may therefore be held together in part, with the oldest named form, *harpalus*, standing as the name of the species. The following pages sum up my data on this group.

10. *Hesperia harpalus* Edwards. Pl. IV, fig. 6, 13.

Pamphila harpalus Edwards, Trans. Am. Ent. Soc. IX, 3, 1881. Nevada.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Pamphila cabelus Edwards, Trans. Am. Ent. Soc. IX, 4, 1881, Nevada.

Pamphila oregonia Edwards, Can. Ent. IX, 150, 1883, California and Nevada.

Pamphila comma race *oregonia* Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Erynnis harpalus Holland, Butterfly Book, Rev. Ed., 373, pl. LII, fig. 19 (male type), 1931.

Erynnis cabelus Holland, Butterfly Book, Rev. Ed. 373, pl. LII, fig. 17, 18 (types), 1931.

Erynnis oregonia Holland, Butterfly Book, Rev. Ed. 372, pl. LII, fig. 5, 6 (types), 1931.

Hesperia yosemite Leussler, Ent. News. XLIV, 169, 1933. Near Yosemite and Big Oak Flat near Yosemite Valley, California.

An examination of Edwards' types after the lapse of many years recalled facts that I did not suspect when I first saw them. *Harpalus*, *cabelus* and *oregonia* proved to be slight variants of a species common in central California, particularly in the Yosemite area. Leussler was justified in naming the species, in view of the confusing comments that others have published on these types. *Harpalus* is the oldest name, although it has only page priority over *cabelus*. The female type, illustrated in Holland's plate LII, fig. 20, is not even a *Hesperia*, but a female of *Polites sabuleti*, pale enough to be placed as *comstocki* Gunder.

On the upper surface the species is very broadly yellow-fulvous, this shade reaching the transverse row of spots of the primaries in all but the darkest males and leaving only a narrow dark margin on the secondaries. Females are very variable. The yellow-fulvous suffuses most of the wing in ordinary specimens, but leaves the spots discernible. Occasionally the wings are entirely fuscous with small spots on the primaries but only a trace on the secondaries. In such specimens the fuscous is sparsely sprinkled with fulvous scales, giving the wings a characteristically vague shading.

On the under surface males are typically of a faded buff shade, varying gradually into the mottled ochreous of *leussleri*. The spots are faintly visible, paler but not white, or in occasional specimens reduced in size and number. I have seen no wholly immaculate specimens. Females are usually better marked below and of a darker color. The overscaling is pale greenish or ochreous gray, and the row of spots is of moderate size, complete, but usually with the spot at each end greatly reduced. One female in my series is very pale below, almost whitish, with a few very small white spots.

Expanse: male, 25-31 mm; female, 27-33 mm.

Distribution: I have recorded a few specimens under this name from Oregon

and southern California, June and July, but most of my series come from various localities in the Yosemite area, bearing dates from May through July, and in early September. Altitudes up to 3,000 feet are indicated. Since the form intergrades with others of the species, presumably unusual seasons in other regions may bring about the development of characteristics approximating this form, but it is evidently to be expected chiefly in the moderate altitudes of the western slope of the Sierra Nevada.

10a. form *idaho* Edwards. Pl. IV, fig. 19, 20.

Pamphila colorado var. *idaho* Edwards, Can. Ent. XV, 148, 1883, Oregon, Washington, California.

Pamphila comma race *idaho* Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Hesperia comma race *idaho* Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI 86, 1931.

Erynnis idaho Holland, Butterfly Book, Rev. Ed. 371, pl. LII, fig. 3, (type), 1931.

The identity of *idaho* is nicely fixed by reference to the type. Unfortunately Holland's figure is of no value, for the under surface alone is distinctive, but the type is in good condition and easily recognizable as the pale, brightly marked form of very wide distribution. The fulvous of the upper surface is never darker than average and is usually much paler, even decidedly tawny. This color often suffuses the entire upper surface of males, encroaching upon all spots and leaving the black stigma and sometimes black veins in sharp contrast. Even in darker specimens the fuscous margin is poorly defined inwardly. Females vary from almost wholly grayish fuscous with the transverse spots only tinged with tawny, to broadly suffused with tawny fulvous, all but the apical spots showing with slight contrast against this background.

The under surface is equally variable. Overscaling of males ranges from pale ochreous to grayish or slightly greenish ochreous. In females it is definitely more grayish, but usually has a slightly ochreous or greenish tinge. The macular band is slender to moderate in males and moderate to broad in females. It is characteristically of a lustrous silky white. In both sexes the band varies extremely in the form and relative sizes of various spots, with occasional extreme extension along the veins.

Expanse: male, 26-32 mm.; female, 30-34 mm.

Distribution: *Idaho* is abundant in the sage-brush lands of northeastern California and adjoining areas in Nevada and Oregon. I have taken it in Modoc County in July in such areas. I have specimens also from localities in Washington, Oregon, Nevada and Montana, most dates ranging through July and August, with a few late in June. I have taken specimens on the western slope of the continental divide at 8500 feet in late July that I refer to *idaho*, and have a series from several localities in Wyoming, Manitoba, Washington, and California that I cannot separate satisfactorily. These last are very small, especially a few from the Teton Mts. with males of 26 mm. expanse and females of 30 mm. Leussler

has specimens from Sioux County, Nebraska, August 17, and from Deadwood, S. D., August 20 and 21.

The form intergrades with *assiniboia* to the northeast and with *leussleri* to the south and east. Typically it is easy to distinguish by its pale appearance and silky white spots, but in any region sporadic individuals are likely to occur that cannot be placed accurately among the several forms of *harpalus*.

10b. form *assiniboia* Lyman. Pl. III, fig. 3, 10; Pl. IV, fig. 7, 14, 21.

Pamphila manitoba var. *assiniboia* Lyman, Can. Ent. XXIV, 59, 1892. Regina, Canada.
Pamphila comma form *assiniboia* Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Erynnis assiniboia Holland, Butterfly Book, Rev. Ed. 371, pl. LII, fig. 4, 1931.

Typically this form is one of the most easily recognized in the genus. The upper surface is very much like that of *idaho* as a rule, with the fulvous markings tawny to average in depth and the fuscous areas rather grayish. Females are very often almost wholly fuscous, but such specimens do not appear extremely dark because the marginal areas are usually sprinkled with pale tawny scales, giving them a slightly hoary appearance.

On the under surface males vary from pale ochreous to a more grayish shade, evidently due to slightly less density of overscaling. A faint greenish tinge may be present. Females, on the other hand, are characteristically pale greenish, varying from this to decidedly gray overscaling. This pale grayish-green under surface is one of the distinctive characteristics most easily noted. The macular band of the secondaries varies in both sexes from total absence to complete presence with moderate width. I have seen no specimens in which the spots are large. When present they are usually white in females but rarely so in males. Members of the latter sex with white spots and ochre background are very much like some specimens of *idaho*, and females with gray under surface and well developed white spots approach the same form.

Expanse: male, 27-31 mm; female, 29-33 mm.

Distribution: The types were collected at Regina, Saskatchewan in September. My series comes largely from Miniota, Manitoba, where Mr. Hugh A. Gibbon has secured me many perfect specimens. All were taken in August, from the fourth to the twenty-first. In a small series from Beulah, Manitoba, this season is extended into late July for both sexes. I have placed here with some hesitation a few specimens from Oregon and one from Yellowstone Park. One male from Deadwood, S. D., August 21, 1912, collected by R. A. Leussler with specimens mentioned under *idaho*, is close to *assiniboia* in its yellowish spots and grayish-ochre overscaling, although its expanse of 35 mm. is large for *assiniboia*. A male specimen in the Carnegie Museum from Boulder, Colorado is similar. A female from Idaho and a male from New Mexico sent by E. L. Bell from the American Museum also seemed referable to *assiniboia*. These cases are probably the isolated examples that may result in a variable species now and then,

far from the usual center of distribution, probably due to the effect of unusual seasons.

The extreme variability and frequently hoary appearance of the form are striking. The spots of the under surface of the secondaries may be lacking from parts of the band and well developed elsewhere, or may be uniformly small or large. On the upper surface, in addition to the variable extent of the two colors, females often show a pale streaking of the veins that is odd.

It seems reasonable to regard *assiniboia* as a prairie variant of the species.

10c. form *leussleri* Lindsey. Pl. I, fig. 11; Pl. V, fig. 1, 8.

Hesperia colorado form *leussleri* Lindsey, Ann. Ent. Soc. Am. XXXIII (2), 373, 1940. San Diego Co., Cal.

Hoffmann, Cat. Sist. Zoog. Lep. Mex. Pt. 2, 268, 1941.

Lindsey, Ann. Ent. Soc. Am. XXXIV (4), 771, 1941.

Leussleri is much like *idaho* above, with tawny to moderate fulvous areas varying greatly in extent in both sexes. Typically the males have ochreous overscaling on the undersurface and show no fuscous save the stigma and a slight basal shade on the primaries. In the darkest specimens a grayish shade darkens the ochreous color except in the anal area and a small discal patch. The spots vary from white to pale ochreous and from very short, forming a slender band, to moderate size.

The overscaling in females is also ochreous, but is sometimes so sparse that the wing has a brownish appearance. The spots are moderately large and white, only occasionally reduced.

Colorado specimens vary from this typical form to an occasional individual with decidedly greenish overscaling below. Males may have the spots very small, partially lacking, or almost wholly obliterated.

Expanse: male, 27-31 mm.; female, 28-32 mm.

Distribution: The type series came from various localities in San Diego, Riverside and Los Angeles Counties, California and were taken mostly from the middle of June to July 20. I have other specimens taken early in June in San Bernardino County. Colorado specimens from the Philadelphia Academy considered in describing *ochracea* were typical *leussleri*, and later I received a series of 27 males and 7 females from Robert Whittaker, most from Bailey, Colorado, August 13 to 21. One male, Moffat County, Colorado, June 22, is slightly greenish, and could as logically be placed either here or with *idaho*; it is typical of neither. Hoffmann lists the form from northern Lower California.

Some of these Colorado specimens, particularly females, could be referred to *colorado*, but they are much lighter in color and yet have much smaller spots on the under side of the secondaries. Mr. Whittaker's notes indicate that his specimens were taken in dry meadows at 7000 to 8000 feet. He also writes that it flies from the first of August until some time in September, his collecting trip having ended September 3. The Moffat County male is an exception. On the

whole, the opinion cited under *colorado* that we have here two species, one appearing somewhat earlier and flying at higher altitudes, the latter later and lower, seems tenable. It agrees with Scudder's original observations and is well supported by Whittaker's careful records. *Leussleri* forms the connecting link in this relationship leading to the separation of *harpalus* from the old association with *colorado* and with the supposed *comma* complex of the New World.

10d. form *ochracea* Lindsey. Pl. V, fig. 15.

Pamphila comma race *oregonia* Lindsey, U. Ia. Studies Nat. Hist. IX (4), pl. I, fig. 13, 1921.
Hesperia colorado form *ochracea* Lindsey, Ann. Ent. Soc. Am. XXXIV (4) 770, 1941.
Colorado.

Ochracea is the most uncertain form of *harpalus*. Indeed, I should be doubtful of the association but for the fact that it intergrades with *leussleri*. The upper surface is extremely variable, as in all of these forms, one of the male paratypes in my possession being almost wholly yellow-fulvous and another male specimen no more so than the average. Paler specimens have the fuscous border so slender in this sex that even the preapical and extracellular spots of the primaries are inconspicuous. The veins are dark. Females show all of the spots, more or less clearly according to the extent of fulvous. In paler specimens this color is yellowish and extends almost to the outer margin, making all outlines diffuse.

The under surface of a male lent to me by J. W. Tilden first attracted my attention to this form. It was a uniform deep rich ochre. A few other specimens secured later showed the range of maculation to be from whitish to almost as dark as the ground color, and the band on the secondaries may be incomplete. The overscaling of the under surface in the female is often more sparse, but it has a definite ochreous tint, slightly greenish in some specimens. The spots are moderately developed, white or whitish.

Expanse: male, 25-32 mm.; female 32-36 mm.

Distribution: The type series of forty specimens came from various localities on the eastern slope of the Continental Divide in Colorado. The dates on this series are confusing. A large majority bear dates from August 1 to August 24 and a few of Oslar's specimens are labelled simply September, which would probably fix the season as August and early September. In sharp contrast, one male paratype collected by Oslar at Mill Gulch is dated June 5 and another, labelled only Colorado, is dated June 25. The altitude range indicated in this series is 7000 to 9500 feet.

In general these data are harmonious with those of *leussleri*, but it is confusing to find decidedly different tendencies in these specimens and in *leussleri* from western Colorado. Until more is known of the habits and early stages of these insects, however, I can make no better arrangement than this. Typically *ochracea* must be regarded as a rather larger form with obscure maculation below, while *leussleri* averages slightly smaller and has well-marked maculation below. Since both are extremely variable, single specimens are certain to appear that cannot be placed with confidence.

11. *Hesperia dodgei* Bell. Pl. I, fig. 12; Pl. V, fig. 2, 9, 16.

Pamphila juba race *dodgei* Bell, Jn. N. Y. Ent. Soc. XXXV, 175, 1927. Santa Cruz, Cal.

Hesperia dodgei Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 87, 1931.

In superficial characteristics *dodgei* is one of the most distinct species of *Hesperia*. In my series of thirty-nine males and nineteen females the upper surface is characteristically dark, with rich but not especially reddish fulvous areas of moderate extent and a correspondingly average extent of dark fuscous. Females are rather more variable in the distribution of these colors than males, varying from average to extremely dark specimens in which the maculation appears sharply defined against an almost wholly blackish background.

The under surface is strikingly different from most of the other members of the genus. The ground color is chocolate brown, fading into a grayish or clay colored anal area in females or ochreous in some males. In some specimens the surface is lightened to a paler brown shade by overscaling that is better developed outwardly on the secondaries than on the disc. I have one such male in which the overscaling is distinctly greenish, hence even these characteristics are not wholly dependable in detail. The spots of the under surface are not pure white, but by contrast they look so in the darker specimens. In lighter individuals they are pale buff, but still contrastingly pale. The form of the band is peculiar. Although complete in many specimens it is very often reduced by the loss of spots behind M_3 . In occasional specimens this portion of the band is wholly lacking, while the more costal spots are large.

Expanse: male, 26–31 mm.; female, 28–33 mm.

Distribution: In the original description Santa Cruz, California is indicated as the type locality and source of all known specimens. The species was discovered by Mr. E. A. Dodge, who wrote to Mr. Bell that it was found only near the seashore. All of my own specimens were taken by J. W. Tilden in Santa Cruz. Mr. Tilden has written several times of increasing scarcity in the colony from which he had collected, due to building up of the area and burning over of waste lands. He mentions a few specimens having been taken in outlying areas, but evidently Santa Cruz remains very definitely the restricted habitat known for the species to date. Mr. Tilden sets the limits of its flight as chiefly late July and August, but says that stragglers in fresh condition appear as late as October 15.

The genitalia are much like those of the preceding group of species.

12. *Hesperia lindseyi* Holland. Pl. I, fig. 13; Pl. III, fig. 4; Pl. V, fig. 10, 17.

Pamphila idaho Wright (not Edwards) Butt. W. Coast 241 (in part), pl. XXXI, fig. 422b, 1905.

Pamphila ruricola Wright (not Boisduval), op. cit. 238, pl. XXX, fig. 416, 1905.

Comstock, Butt. Col. 219, pl. 61, fig. 1–3, 1927.

Pamphila oregonia Skinner & Williams, Trans. Am. Ent. Soc. L, 189, fig. 14, 21, 1924.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXXI, 87, 1931.

Pamphila lindseyi Holland, Ann. Carnegie Mus. XIX, 158, 1930. Nellie and Ukiah, California.

Holland, Butterfly Book, Rev. Ed. 376, pl. LXXIII, fig. 10, 11 (types), 1931.

The most striking characteristic of the upper surface of *Hesperia lindseyi* is its pale color. The fulvous is average to tawny and in the males spreads over both wings so widely that the fuscous margin of the secondaries is very narrow and no more than the preapical and extracellular spots of the primaries, usually only the latter, are within the fuscous area. Some specimens show part of the veins darkened. The darkest males in my possession are still more broadly fulvous than the average for this genus. Females run slightly darker. In them the pale spots appear more frequently distinct than in males against the light fulvous background, and the more caudal spots of the primaries often extend toward the outer margin in pale lines along the veins. Females also show a slight tendency for black points to cut into the pale terminal portion of the fringes which is rarely seen in males.

On the under surface the male has ochreous or more yellowish overscaling, rarely slightly greenish. The macular band of the secondaries is made up of medium to large spots, never pure white but quite strongly shaded with the color of the overscaling. The anal angles of these spots may be extended sharply outward along the veins and the veins of the disc may be pale. Also faintly paler overscaling may extend in between the veins from the outer margin. The whole effect is that of a slight longitudinal streaking of the wing which is still further emphasized by the black points that cut the pale fringes, usually conspicuously. Females have more grayish overscaling. Some in my series show a slightly brownish hue and one is decidedly ochreous. The overscaling along the outer margin is often decidedly paler, even whitish, and black points in the fringes are usually conspicuous. The spots are large, white or whitish, and often extend conspicuously outward along the veins. The veins of the disk are frequently pale.

Expanse: male, 25-31 mm.; female, 28-33 mm.

Distribution: I have seen specimens only from the Pacific coastal region, extending from Oregon through the entire length of California to San Diego County. My only Oregon records are from the southern part of the state. I have caught the species in fair numbers at about 5000 feet in the foothills of the Warner Mts. near Davis Creek, California. There *lindseyi* and *idaho* flew under essentially the same conditions, but I did not find this species at the lower levels where *idaho* was abundant. I have dates as early as May 5 for the southern extremity of its range and May 30 for southern Oregon. Most of my specimens were taken in June, but in Modoc County I caught the insect late in July.

After a little experience with *lindseyi* one develops an appreciation of its peculiar appearance that enables him to place almost any specimen with confidence. The species varies so greatly, however, that none of the characteristics emphasized in the foregoing description is absolutely dependable. Together they should be enough even for the development of a first acquaintance with the species, for it is by all odds one of the most striking of the western members of the genus.

In my early work on skippers I suspected that this must be Boisduval's *ruricola*, as it was treated by Wright. Now that the type label of *ruricola* is

associated with a specimen of *vestris* there is no question of its identity, although that association seems possibly erroneous. Fortunately in trying to apply Boisduval's description now to *lindseyi* I not only fail but wonder how I could ever have held my former opinion, so this question need not trouble us any more in this genus.

13. *Hesperia columbia* Scudder. Pl. I, fig. 14; Pl. V, fig. 3.

Pamphila columbia Scudder, Rept. Peabody Acad. 1871, 77 (56), 1872. California.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 128, 1916.

Pamphila sylvanoides Scudder (not Boisduval), Mem. Bost. Soc. Nat. Hist. II (3), 351, pl. X, fig. 22 (type), pl. XL, fig. 15, 17, 1874.

Pamphila californica Wright, Butt. W. Coast 241, pl. XXXI, 423, 1905.

Thymelicus erynnioides Dyar, Jn. N. Y. Ent. Soc. XV, 50, 1907. Monterey Co., Cal.

Erynnis columbia Draudt, Seitz: Macrolep. V, 929, pl. 180h, 1924.

Holland, Butterfly Book, Rev. Ed. 373, Pl. XLVII, fig. 44, pl. LII, fig. 16, 1931.

Hesperia columbia Comstock, Butt. Cal. 217, pl. 60, fig. 11, 12, 1927.

Lindsey, Bell & Williams, Denison U. Bull. Jn. Sci. Lab. XXVI, 84, 1931.

This odd little species turns up in small numbers but seems never to be plentiful. For that reason this description, based on ten males and two females, may not embrace its full range of variation. Since the twelve specimens are from almost as many localities, they have a reasonable chance of being representative.

The upper surface of the males is fairly uniform with average distribution of fulvous and fuscous. They are also of average depth of color, but the fulvous has a somewhat reddish cast. One of the females is quite pale, the pale fulvous of the base and disk almost completely joining that of the transverse row of spots, which extend in pale dashes along the veins to the outer margin. The darker specimen has a much more evident fuscous area from the base behind the cell to the row of spots, and another beyond the end of the cell on the primaries. The discal area of the secondaries is broadly suffused with fulvous in both specimens but the discal spots show in greater contrast in the darker of the two. In both the marginal area is marked with pale dashes along the veins. The result is a peculiarly diffuse and streaked appearance in both specimens.

The under surface is similar in the two sexes. The primaries, especially along the costa, have a pronounced reddish fulvous tinge, fading toward the inner margin, with little fuscous save at the base and along the stigma of the male. The overscaling in fresh specimens is dense, smooth, and of a peculiar greenish ochre shade. The anal area of the secondaries is pale fulvous. The spots on this surface are white and tend to disappear anterior to M_1 . Usually the spot between R and M_1 is present but small, while from M_1 back at least five spots are developed, forming a straight continuous band. In females and in one of my males there is a very slight tendency for these spots to separate. The pre-apical spots of the primaries are faint and the extracellular spots, while a little more evident, are not pure white.

Expanse: male, 26–30 mm.; female, 31–34 mm.

Distribution: Holland states the distribution of *columbia* as "along the Pacific Coast from British Columbia to California and eastward to Colorado." The

possibility of erroneous identifications in older works on this genus is so great that I feel doubtful of the eastern portion of this range; certainly I am unable to corroborate it either from my specimens or from my notes. I have the species from near Prospect, Oregon, and from various localities southward to Riverside, California. I am not sure of the basis for the inclusion of Arizona in the Lindsey, Bell & Williams revision.

There is a strong possibility that this species is double brooded, since it flies in southern California from late March to the middle of June and from late September to the middle of October. My limited northern records are late June, with one altitude record of 2,000 feet in Oregon.

No one who has once properly identified *columbia* can fail to recognize it by the peculiar color and markings of the under surface.

14. *Hesperia juba* Scudder. Pl. I, fig. 15; Pl. III, fig. 11, 18; Pl. V, fig. 4.

Hesperia comma Boisduval (not Linnaeus), Ann. Soc. Ent. France (2) X, 313, 1852.

Pamphila juba Scudder, Rept. Peabody Acad. 1871, 77 (56), 1872.

Scudder, Mem. Bost. Soc. Nat. Hist. II, 349, pl. X, fig. 19, 20; pl. XI, fig. 5, 6, 1874.

Wright, Butt. W. Coast 239, pl. XXX, fig. 417, 1905.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 128, 1916.

Pamphila viridis Wright (not Edwards) Butt. W. Coast pl. XXX, fig. 418b, 1905.

Erynnis comma form *juba* Draudt, Seitz's Macrolep. V, 1929, 1924.

Hesperia juba Lindsey, Denison U. Bull., Jn. Sci. Lab. XX, 121, 1923 (larva).

Comstock, Butt. Cal. 218, pl. 60, fig. 16-18, 1927.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXXI, 87, 1931.

Erynnis juba Holland, Butterfly Book, Rev. Ed. 372, pl. LII, fig. 7, 8, 1931.

Erynnis juba ab. *ogdenensis* Holland, Butterfly Book, Rev. Ed. 372, pl. LII, fig. 9, 1931.

This large, pale, brightly colored member of the genus is among the most constant and easily recognized species. The fulvous of the upper surface is moderately pale, almost tawny, and is characterized by the sharp borders that separate it from the fuscous marginal areas. On the secondaries, where the fulvous suffusion of the disc merges with the spots, a slightly vague appearance results, but the general impression conveyed by this surface is one of clean-cut definition of all markings. The stigma of the male stands out slender and black for its full length, only in the darkest specimens connecting obscurely with a dark basal area. Females show a more common tendency toward shading of the pale areas with darker fulvous, especially in the cell and along the costa.

The overscaling of the under surface is light grayish green. This color is general over the usual areas in most specimens, varied by slightly darker patches that are very rarely striking. In some specimens sparsity of the overscaling lends a more grayish appearance to the wings. The spots of the under surface are pure white and usually large. Occasionally the band of the secondaries is only moderately wide, but I have yet to see a specimen in which the spots could be called small and I have observed no tendency to obsolescence of any spots. The last spot of the band, behind Cu_2 , usually projects as a sharp point toward the base of the wing. If reduced, the whole spot may be basad of the remainder, connected only at the corner, but as a rule it is broadly continuous with the rest

of the band. I have two males in which the basal projection of this spot is insignificant, but the remainder of the spots in the band are so angular that the general effect of irregularity is scarcely less than in more normal specimens.

Expanse: male, 28-35 mm.; female, 33-39 mm. Both sexes usually near or above the average of these figures.

Distribution: British Columbia to southern California and east into Colorado. My southernmost records are Riverside and Palm Springs, California, and my Colorado records are from a series taken by Robert Whittaker in Moffat County, June 19-23, 1941. Hoffman does not record the species from Mexico. Dates range from early April through early May in southern California. From the northern part of the range I have specimens dated from early May until early July and from early August to early October. Whittaker's series was collected in the mountains up to an altitude of over 8,000 feet.

Holland's aberration *ogdenensis* is subject to opinion. Such pale specimens are not uncommon but they are merely the extreme of a gradual transition, not a conspicuously distinctive form. If one were to name all equivalent forms in this genus the work would be endless—and useless.

I have taken *juba* in the vicinity of Davis Creek, Modoc County, California in large numbers. It flew in the great sage brush plain at the foot of the Warner Mountains with *harpalus* form *idaho*. A single egg was secured when a female deposited it on a blade of grass at the edge of an irrigating ditch. The larva was reared almost to maturity but unfortunately succumbed to a mold when it had to be taken down to sea level.

15. *Hesperia nevada* Scudder. Pl. II, fig. 1; Pl. IV, fig. 2; Pl. VI, fig. 5.

Pamphila nevada Scudder, Mem. Bost. Soc. Nat. Hist. II, 347, pl. X, fig. 1-4, pl. XI, fig. 3, 4, 1874. Colorado, Oregon.

Lindsey, U. Ia. Studies Nat. Hist. IX (4), 70, pl. I, fig. 9, 1921.

Pamphila viridis Wright (not Edwards), Butt. W. Coast 239, pl. XXX, fig. 418c, 1905.

Pamphila colorado Wright (not Scudder), Butt. W. Coast 240, pl. XXX, fig. 421, b, c, 1905.

Erynnis comma form *nevada* Draudt, Seitz's Macrolep. V, 929, pl. 180g, 1924.

Hesperia nevada Comstock, Butt. Cal. 219, pl. 60, fig. 23, 25, 1927.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 86, 1931.

Hesperia nevada is, as the above bibliography shows, among the species that have been rather badly confused in the past, yet it is also among those that are easily recognized by general appearance once one has seen the true species. The species varies on the upper surface from very light to very dark by the restriction or extension of the fulvous areas. In pale specimens this color may be average or more tawny. At least part of the veins are often dark against this pale background. In males the fulvous tends to blend so gradually into the fuscous margin that there is no extremely dark portion except a narrow terminal line, but an occasional dark specimen shows no more than the usual vagueness of the junction of the two colors. On the secondaries, the pale spots are usually completely surrounded by a darker shade of fulvous. Females may be so dark that the clear fulvous is restricted to the spots, or pale fulvous with the exception

of a very narrow terminal line, broadening over the apex of the primaries. In the paler examples the pale spots of the secondaries appear to show through from below, giving the wing a false appearance of transparency. Even the darker specimens have a sufficient sprinkling of fulvous scales throughout to have a distinctive appearance. The preapical and extracellular spots of the primaries are sometimes almost white.

The under surface usually has a fairly heavy dull greenish gray overscaling whose sparsity makes the wings appear unusually dark. It may, however, be quite dense and of a rather bright green shade, and in females it is often paler and grayer. The macular band is pure white and very irregular. I have seen only one male specimen in which the spots were generally reduced in size; usually they are medium or large. The spot before R of the secondaries may be very small, however, and that behind Cu_2 may be reduced and broken into two dots. The two extracellular spots usually stand out beyond those of the adjoining spaces, the two between M_3 and Cu_2 are joined, and that behind Cu_2 is set so far basad that it connects with the rest of the band by no more than a narrow angle, and is often independent.

Expanse: male, 26–31 mm.; female, 31–35 mm.

Distribution: I have found this species abundant on the sagebrush slopes near Almont, Colorado at about 8,000 feet, in late June and early July, with *uncas*. Other Colorado specimens in my collection, taken during the same months, run as high as 9,600 feet, but evidently the species sticks to dryer regions for I failed to find it at 8,500–10,000 feet near Gothic, Colorado in grassy meadows. I have Montana specimens taken late in May, and a few from Woodford's, California, 6,500 feet, July 6 (Tilden). On June 12, 1922 I took a female among the sagebrush in the sandy area at Hackstaff (or Rayl), California, a junction point of the Western Pacific and the N.C.O. railways. I have notes on specimens in the British Museum from Vancouver Island and Alberta, and Mr. Hugh Gibbon reports it from Miniota, Manitoba. Without actual Arizona records, I cannot offer further comment on this reported southern extent of distribution.

Although *nevada* is easily recognized as a rule when one has made its acquaintance, occasional specimens with heavy green overscaling and large spots below, usually females, resemble *juba* very closely. In such cases the upper surface, contrary to the usual rule, is more distinctive. Its very diffuse ground color, in contrast with the sharply defined markings of *juba*, quickly separates the two species. Otherwise the very irregular macular band on the under surface of the secondaries is usually enough of a distinction in either sex.

16. *Hesperia dimila* Moore. Pl. II, fig. 2; Pl. VI, fig. 12.

Pamphila dimila Moore, Proc. Zool. Soc. Lond. 1874, p. 576. Runang Pass, Busahir, about 13,000 ft.

Erynnis comma var. *dimila* Elwes and Edwards, Trans. Zool. Soc. Lond. XIV (4), 287, 1897. Reverdin, Bull. Soc. Lep. Genève III, 202, pl. 9, fig. 4, 12, 1917.

Since this description is based on only six males and three females it may easily be deficient. All of these specimens have the fulvous of the upper surface

about average in extent and of a slightly paler shade than the average. In both sexes the transverse row of spots shows clearly, but in the males it is somewhat fainter against the more extensive fulvous, while in the females it is outwardly next to the fuscous border. In both sexes the veins are black-lined to a conspicuous degree. The pale fringes show slight evidence of black dots.

On the under surface the secondaries are unlike any other species known to me. The overscaling is pale greenish gray and may be restricted to the discal and costal areas. If sparse, it reveals a deeper grayish ground color. This overscaling may extend variably along the marginal area outside of the row of spots, often reaching M_3 and sometimes extending to Cu_2 . It also marks a narrow inner margin. Usually the anal area is of a rather clear buff or ochreous hue and the same color extends forward outside of the spots to M_3 and appears on the disc in a few specimens. The veins are black, standing out strikingly in the pale areas. The spots are pure white, usually large and separated only by the dark veins, but sometimes slightly crescentic and correspondingly farther apart. Dark dashes appear in the fringes, which are pale but not white.

Expanse: male, 27-31 mm.; female, 31-33 mm.

Distribution: My few specimens are from Bashar and Kashmir in the Himalayas. More specifically Taglang Pass, 5000 meters, July 15-30, and Schipki-La, 4000 meters, July, are indicated, but I fail to locate either pass on the National Geographic Society's map of Asia. My notes on British Museum specimens include records from similar localities, 14,000 to 16,000 feet, August, and one rather dark male from Batang, eastern Thibet, 3800 meters, June 6. The last and two males from Ta-tsien-lou, about 300 miles west of Chungking in western China, are very pale below, almost ochreous, but with the dark veins characteristic of the species.

This interesting species is evidently confined to the Himalayas, and as far as the records indicate, it is the most extreme of the high-altitude members of the genus.

17. *Hesperia woodgatei* Williams. Pl. II, fig. 3; Pl. V, fig. 11.

Pamphila woodgatei Williams, Ent. News XXV, 266, 1914. Jemez Mts., New Mexico.

Hesperia woodgatei Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 88, 1931.

Erynnis woodgatei Holland, Butterfly Book, Rev. Ed. 372, pl. LII, fig. 11 (paratype), 1931.

My only specimens of *woodgatei* are a pair provided by Captain R. C. Williams, Jr., the author of the species. Both have moderately broad and diffuse fulvous areas with a rather marked reddish tinge, although the color is paler in the female, particularly in the spots. The stigma is fairly broad.

On the under surface both specimens are deep gray-brown on the apex of the primaries and over the secondaries with the exception of the anal area, which is tinged with ochreous. Although the specimens are quite worn and a few traces of ochreous overscaling can be made out under a lens, I remember other series of *woodgatei* that I have seen as also showing an unusually dark under surface.

The spots are white, reduced in size and only moderately well defined, and are quite widely separated. This characteristic also I recall as prevalent.

Expanse: Male and female, 34 mm.

Distribution: My specimens are from the Jemez Mountains and were taken late in September. I have applied this name to a male from Rincon, N.M. and a female from Plumas County California, both taken in July, in the collection of the University of Kansas. The species is also reported from Texas and Arizona, and flies in October as well as September.

Dearth of material adds uncertainty to these notes. Recognizing the great variation of these western species, it is at least conceivable that occasional specimens may have heavier overscaling and a more nearly continuous macular band, and that specimens of *pahaska williamsi* with reduced spots might resemble them. This is pure speculation, of course, but it may be worth considering by those who have access to larger quantities of southwestern material. Holland's figure is an excellent representation of the species with a rather extreme reduction of spots.

18. *Hesperia viridis* Edwards. Pl. II, fig. 4; Pl. V, fig. 12, 19.

Pamphila juba var. *viridis* Edwards, Can. Ent. XV, 147, 1883. Las Vegas, New Mexico.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 129, 1916.

Pamphila viridis Lindsey, U. Ia. Studies Nat. Hist. IX (4), 71, pl. I, fig. 12, 1921.

Erynnis comma form *viridis* Draudt, Seitz's Macrolep. V, 929, pl. 180g, 1924.

Hesperia viridis Comstock, Butt. Cal. 219, pl. 60, fig. 20-22, 1927.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 88, 1931.

Field, Bull. Dept. Ent. U. Kansas No. 12, p. 244, 1938.

Hoffmann, Cat. Sist. Zoog. Lep. Mex. Pt. 2, 268, 1941.

Although I have seen some large series of *viridis* in the past, no collector with whom I have corresponded lately has been able to secure more than a few specimens for me. Eighteen males and seven females can easily fail to show some variants of a species in *Hesperia*, but these specimens have been gathered from so many sources that they seem likely to be representative. The males are rather dark, in that the fulvous area of the primaries extends only to the end of the stigma, so that the preapical, extracellular and one other spot are isolated in the fuscous area. The stigma is rather slender. On the secondaries the transverse row of spots is evident but not conspicuous. The fulvous suffusion of the disk varies greatly, but even when extensive it is evidently a suffusion of a darker ground color. The fringes are white tipped.

Females are also dark, showing the transverse rows of spots, of rather small size, against a grayish fuscous background with some fulvous suffusion.

On the under surface the overscaling is of a decided green in fresh specimens but it has a tendency to fade to a buff or ochre shade after the passage of years. Evidently the conditions surrounding specimens have something to do with the change, for even old specimens sometimes remain greenish. Worn specimens show the grayish brown ground color in varying degrees. The spots are pure white and often narrowly dark-bordered. They vary in size from moderate to

large and form a complete series from SC to 1st A, with the last spot in the series distinctively placed. Instead of projecting basad as in so many other species, this spot is even with the next or slightly nearer the outer margin of the wing basad, and outwardly it often extends conspicuously toward the outer margin. The result is that the three spots behind M_3 form a row that is basally convex and outwardly straight or concave, with the posterior end as near to the outer margin of the wing as the anterior, or nearer.

Expanse: male, 27-33 mm.; female, 31-35 mm.

Distribution: The species occurs from central Colorado into Texas, New Mexico and Arizona. In the collection of the University of Kansas I found one female labelled Verdi, Nevada, July 1903. Dates in my series extend from late June to late September. I have seen altitude records up to 7500 feet.

The form of the band on the under surface is normally distinctive of *viridis* but I have seen females in which it was sufficiently different to be confusing. As far as I know *pahaska* is the only species likely to have a similar band, and in *pahaska* the band is rarely, if ever, outwardly concave. Females with the band straight or with the last spot broadly diffused into the anal area, will be the chief source of difficulty.

19. *Hesperia pahaska* Leussler. Pl. II, fig. 5; Pl. V, fig. 18.

Hesperia pahaska Leussler, Ent. News XLIX, 5, 1938. Near Harrison, Nebraska.

The upper surface, through the entire range of variation of the species, extends from extensively fulvous to very dark, with the fulvous in males restricted to the spots and to the primaries as far out as the distal end of the stigma. The color may be rather warm and bright to pale tawny fulvous. In darker females the spots alone may be clear fulvous but even in these specimens the fuscous areas are noticeably sprinkled with this color. The fringes show white tips.

The under surface has overscaling of a bright ochreous shade, varying to slightly greenish. In worn specimens and possibly in some fresher specimens sparsity of overscaling makes the grayish brown ground color evident. The spots are white and typically of moderate size and not reduced in number. The three behind M_3 form a straight row, the last not projecting noticeably basad although all three may be slightly angled toward the base of the wing. Females are much like males on this surface.

Expanse: male, 28-32 mm.; female, 32-34 mm.

Distribution: My series of typical *pahaska* ranges from Great Falls, Montana, through western Nebraska and Colorado into New Mexico and Arizona. One female in the Philadelphia Academy from Jackson Hole, Wyoming, 6500 feet, expanding only 27 mm. seemed to belong here, and one male labelled Ft. Klamath, Oregon, is in the same collection. The season extends from the middle of June through July, but in the southern states is evidently from April into September. I have one typical specimen from Pima County, Arizona, dated April 1 (Poling), and my specimens of the form *williamsi* are dated May and September. Arizona records from other collections include August.

I see no reason why students of this genus should have difficulty in placing specimens of this species, although they may need to refer to the male genitalia to be confident of their first identifications. The form of the band on the under surface of the secondaries approaches that of *viridis*, but the last spot is more evenly placed and the caudal segment of the band is straight rather than crescentic. Since this last spot is sometimes broad and blurred in females, this sex may occasionally be troublesome.

19a. form *williamsi* Lindsey. Pl. III, fig. 9; Pl. V, fig. 5.

Erynnis comma Godman & Salvin (not Linnaeus), Biol. Cent.-Am., Rhop. II, 477, 1900.

Hesperia pahaska form *williamsi* Lindsey, Ann. Ent. Soc. Am. XXXIII, 375, 1940.

Hoffmann, Cat. Sist. Zoog. Lep. Mex. pt. 2, 268, 1941.

Williamsi is a pale form of *pahaska* that seems to be rather common in Arizona, New Mexico and Texas, extending south into Mexico. It is variable above, but with a tendency to broad suffusion with a rather bright yellow-fulvous. Whether light or dark above, the under surface is characterized by the pronounced pale ochreous to very slightly greenish overscaling and the reduction of the spots, which are frequently very small, rounded and separate. The reduced spots may have dark margins.

Expanse: male, 26–30 mm.; female, 30–33 mm.

Distribution: I have seen this form only from the border states mentioned, barring the one specimen collected by Morrison in northern Sonora and treated by Godman and Salvin as *comma*. The insect flies from April 1 to the middle of September.

At first I picked *williamsi* as an undescribed species, but later associated it with typical *pahaska* through a comparison of the genitalia. The two intergrade, but in their typical forms they are very different in appearance, certainly enough so to lead to confusion and to justify a name to emphasize the variation. A series of true *pahaska* from the border states, sent to me from the British Museum, shows that the form is not strictly a geographic race, and the dates show that it is not a seasonal variation. Presumably it is associated with drier and warmer climatic conditions.

20. *Hesperia leonardus* Harris. Pl. II, fig. 6; Pl. III, fig. 12, 19; Pl. V, fig. 6.

Hesperia leonardus Harris, Ins. Inj. Veg. 3rd Ed. 314, fig. 138, 1862. Massachusetts.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 88, 1931.

Field, Bull. Dept. Ent. U. Kans. No. 12, 244, 1938.

Macy & Shepard, Butterflies, 211, 1941.

Erynnis leonardus Holland, Butterfly Book 349, pl. XLVII, fig. 35, 36, 1898.

Holland, Butterfly Book, Rev. Ed. 376, pl. XLVII, fig. 35, 36, 1931.

Leonardus is one of the darkest species of *Hesperia*. The fuscous areas of the upper surface may almost be called black in fresh specimens, and the fulvous is often of a deep shade. Even when paler, this shade is often restricted to the transverse row of spots and the twin spot in the end of the cell of the primaries,

so that the general appearance of the wing is very dark. The basal area may have some fulvous, in the male, and in both sexes has a superficial suffusion of this color. The fringes are dark except for pale tips at the anal angle of the secondaries.

The under surface is conspicuously different from all other species. The ground color of the costal and apical areas of the primaries and of the entire secondaries varies from a light brick or rust red to a deep red-brown. The remainder of the primaries is black. The spots of the under surface of the primaries are ochreous and those of the secondaries are commonly creamy white, appearing white in contrast with the dark surrounding color. The secondaries have only one spot in the end of the cell in addition to the transverse band.

Expanse: male, 29-34 mm.; female, 31-36 mm.

Distribution: Georgian Bay, Ontario, and Enfield, Maine, are the northernmost records in my series. Published records indicate northern Florida as the extreme southern range. On the west I have specimens from Willard, Missouri (A. E. Brower), and a specimen in the Snow Collection adds Douglas Co., Kansas, as a more westerly limit. Leussler, after his many years of careful collecting at Omaha, does not report the species, so evidently it is not common so far west. It is on the wing in late August and early September.

Leonardus is almost identical with *meskei* on the upper surface. It has a well-marked spot anterior to M_1 of the secondaries in most specimens, whereas *meskei* has no more than a few fulvous scales, but this is scarcely a conspicuous difference. On the under surface, however, the two are utterly different, since *leonardus* alone has definite pale spots.

21. *Hesperia meskei* Edwards. Pl. II, fig. 7; Pl. V, fig. 13, 20.

Pamphila meskei Edwards, Can. Ent. IX, 58, 1877. Bastrop Co., Texas.

Pamphila straton Edwards, Papilio I, 78, 1881. Florida.

Ochlodes meskei Draudt, Seitz's Macrolep. V, 934, 1924.

Erynnis meskei Holland, Butterfly Book, Rev. Ed. 376, pl. LII, fig. 32, 33, 34, 1931.

The upper surface of *meskei* is very dark fuscous, quite black in the freshest specimens. In the male the transverse row of spots and the double spot in the end of the cell of the primaries are fulvous, and one specimen in my series has all of these marks broadened basad. The base may also be lightly marked with fulvous. The row of spots on the secondaries is usually quite broad and vague, extending forward only to M_1 . My palest specimen has this fulvous band broadly extended basad into the end of the cell, so that the whole disc is light. Females have the spots of the primaries even more sharply defined and restricted, while those of the secondaries are comparatively small and poorly defined. One fresh female in my series is black with only a faint suggestion of fulvous suffusion basally, and with all spots rather small and conspicuously contrasting. The fringes are slightly paler at the tips.

The under surface of the secondaries and of the costal and apical portions of the primaries has a heavy overscaling of a reddish ochreous hue, in one of my

females with a faintly greenish shade on the disc of the secondaries. The primaries are otherwise black excepting the spots. The spots of the secondaries vary from the vaguest of pale areas, scarcely visible against the slightly darker overscaling, to a distinct row between M_1 and Cu_2 , a small dot in the end of the cell, and sometimes one spot before M_1 . Even when this distinct, however, the spots are small, indistinctly outlined, and only a little paler than the overscaling.

Expanse: male, 30–34 mm.; female, 32–36 mm.

Distribution: North Carolina to Florida and west into Texas. May and June, September and October, hence evidently double brooded. The British Museum has one male taken at Southern Pines, N. C., June 14, by William T. Davis. I know also of one Arkansas record and have seen Texan specimens other than the Edwards material.

Meskei has been one of the rarest of skippers in collections. I am indebted to Mr. Dean F. Berry for a series of seven males and three females taken at Orlando, Florida, from late September to the middle of October. All are dark, but their variation suggests that paler specimens may occur that my description would not cover. The generally dark appearance and the distinctly reddish tinge of the under surface are quite different from the characteristics of other species with vague maculation below.

22. *Hesperia attalus* Edwards. Pl. II, fig. 8; Pl. III, fig. 5, 6.

Pamphila attalus Edwards, Trans. Am. Ent. Soc. III, 276, 1871. Waco, Texas.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 126, 1916.

Erynnis attalus Scudder, Butt. E. U. S. II, p. 1653, 1889.

Holland, Butterfly Book 349, 1898.

Draudt, Seitz's Macrolep. V, 930, pl. 180h, 1924.

Holland, Butterfly Book, Rev. Ed. 374, pl. XLVII, fig. 23, pl. LII, fig. 24 (type ♀) 1931.

Hesperia attalus Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 88, 1931.

Field, Bull. Dept. Ent. U. Kansas, 12, p. 245, 1938.

Leussler, Ent. News I, 34, 1939.

I think of this species as common in some areas, yet I have been able to secure only one male and two females of the typical form. This description must therefore be exceedingly circumscribed. The male has more than the average amount of fulvous, of a decidedly pale shade. The secondaries are unusual, with an evident fulvous streak through the cell and the usual transverse row of spots but no broad fulvous suffusion. The two females are almost wholly grayish fuscous above, with the transverse row of spots and those at the end of the cell whitish tinged with fulvous on the primaries and definitely pale fulvous on the secondaries. The fringes are white tipped in both sexes. The stigma of the male is slender and is in contact with the cubital stem only along the distal half of the longer bar, while in the more closely related species this bar is almost wholly apposed to the cubitus.

On the under surface typical *attalus* is a pale insect, with little fuscous on the primaries and a heavy overscaling of pale ochreous over the usual areas. The spots vary greatly. My one male has on its secondaries a short faint band of

small rounded spots, scarcely paler than the ground color, while my two females have, respectively, three and five small white dots.

Expanse: male, 34 mm.; female, 36 mm.

Distribution: *Attalus* is said by Holland to occur "very rarely in New England" and Macy and Shepard say that it "is known to occur more or less rarely along the Atlantic Coast from Massachusetts to Florida and west to Texas. . . ." I cannot corroborate the northern records specifically, but the species certainly ranges well northward in the eastern states and westward into Texas, where my three specimens were taken on September 12. I also have specific Florida records in March, April and May, so it is probably double brooded in the south. As for middle western records, the Snow collection at the University of Kansas contains one specimen from Montgomery Co., Kansas, and Mr. R. A. Leussler has taken a few specimens at Omaha, Nebraska, in late June. I am puzzled by Wisconsin records. They have been published on good authority and one of my Wisconsin correspondents promised me a long series but failed to deliver a single specimen!

Attalus appears to me most like *pawnee*. Females, indeed, may resemble each other very closely. The stigma of *attalus*, however, is more slender and peculiarly placed, as indicated in the description. I have seen one male from Orlando, Florida, that was dark, with such a rich shade of fulvous that the upper surface resembled *meskei*. The under surface readily separates these species.

22a. form *seminole* Scudder

Ocytes seminole Scudder, Rept. Peab. Acad. 1871, 76(55), 1872. Florida.

Erynnis attalus quaiapen Scudder, Butt. E. U. S. II, p. 1655, 1889.

Pamphila slossonae Skinner, Ent. Amer. VI, 138, 1890. Florida.

Pamphila attalus form *seminole* Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 126, 1916.

Erynnis seminole Holland, Butterfly Book, Rev. Ed. 374, pl. LII, fig. 25, 26, 27, 1931.

Here I am limited to a single pair of worn specimens and observations based on other collections. *Seminole* is a Florida form of very dark appearance. The fulvous of the upper surface is almost wholly restricted to the spots in both sexes. On the under surface the ground color is almost entirely fuscous, with a very limited fulvous shade along the costa of the primaries and greatly reduced over-scaling. The spots are small, rounded, poorly defined but contrastingly pale, and are variably reduced in number.

Expanse: Like that of the typical form.

Distribution: Florida.

With Bell and Williams I discounted the value of this name. The contrast between my two dark and three light specimens is so great that I am retaining it here, pending the study of more extensive series. If it is at one extreme of a gradation, I should still feel that the retention of the name is not desirable unless the contrast in fresh specimens is great enough to lead to confusion in identifying them.

23. *Hesperia ottoe* Edwards. Pl.II, fig.9.

Hesperia ottoe Edwards, Proc. Ent. Soc. Phil. VI, 207, 1866. Kansas.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI.

Macy & Shepard, Butterflies, 207, 1941.

Pamphila ottoe Scudder, Mem. Bost. Soc. Nat. Hist. II, 348, pl. X, fig. 6, pl. XI, fig. 13, 1874.

Erynnis ottoe Draudt, Seitz's Macrolep. V, 930, pl. 180 i 1924.

Holland, Butterfly Book, Rev. Ed. 374, pl. XLVI, fig. 11, 12 (types), 1931.

This magnificent prairie species is typically light yellow fulvous above with a very narrow fuscous terminal margin and whitish fringes. Very faintly darker shades over the apex of the primaries reveal the preapical and extracellular spots, and the stigma is margined with black scales. The under surface is also broadly tawny, with only a little paler color near the inner margin of the primaries and some black basally and along the stigma.

Edwards associated no female with his single male type, and more recent studies indicate far less variation in this sex, so extremely pale females are not to be expected. The species occurs far more abundantly in the form *ogallala* Leussler. Indeed, the retention of two names is scarcely to be desired.

Expanse: male, 33-35 mm.

Distribution: My northernmost record is Sioux City, Iowa, and since the South Dakota State College collection includes no *ottoe* but many of the related *pawnee* from Volga, South Dakota, it is to be presumed that the northern limit of the species lies somewhere between the two localities. *Ottoe* extends into Nebraska and Kansas. I cannot say whether the Montana specimens in the Barnes collection are this species or *pawnee* now that the two are separated. The species is moderately plentiful in late June and early July on virgin prairie, but gives way quickly before haying or grazing. Gibbon reports *ottoe* from Manitoba but his specimens are likely to have been pale *pawnee*.

After associating this species with *pawnee* as only an early brood, and defending the idea against Dodge, the author of *pawnee*, I must recognize their difference. Brigadier Evans called my attention to the difference in genitalia which is so easily checked. *Ottoe* has a large proximal tooth on the valve while *pawnee* has only a rudimentary tooth. I found it possible to check this point by examining the type under a binocular at Pittsburgh. This fact places *ottoe* as the early summer form and *pawnee* as the later species, so dates alone suffice to separate the superficially similar males.

The extremely pale type is an example of variation that occurs in both *pawnee* and *ottoe*. I suspect that it is more common in extremely dry seasons, although I lack conclusive evidence.

23a. form *ogallala* Leussler. Pl.III, fig.13.

Pamphila ogallala Leussler, Ent. News XXXII, 206, 1921. Western Iowa and Nebraska.

Hesperia ottoe form *ogallala*, Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 91, 1931.

Macy & Shepard, Butterflies, 208, 1941.

Erynnis ogallala Holland, Butterfly Book, Rev. Ed. 375, pl. LXXIII, fig. 20, 21 (paratypes), 1931.

Ogallala is the common form of *otloe* in the Missouri valley. Males are variably dark. In average specimens the wing is light fulvous from the base to well beyond the stigma, leaving a moderately wide but very vaguely separated fuscous border. In its inner margin the preapical and extracellular spots may be faintly evident. The secondaries are fuscous along the costa, in the anal area, and more narrowly along the outer margin. Part of the veins are frequently dark. The under surface is almost uniform, varying from pale dull ochreous to a more yellowish shade. Spots are comparatively rare, but occasionally the usual transverse row of small, very faint, diffuse spots appears on the secondaries.

The upper surface varies toward the pale condition of typical *otloe* on one hand and toward a much greater contraction of the fulvous areas on the other. In darker specimens the fulvous of the secondaries often extends in points on the veins toward the outer margin.

Females are mostly fuscous. The maculation of the primaries is diffuse and tinged with fulvous which extends outward along the veins. The two spots between M_3 and Cu_2 are whitish and translucent. All dark areas are more or less sprinkled with fulvous. The same is true of the discal area of the secondaries, in which the row of spots is very vaguely indicated. The extension of the fulvous along the veins is usually conspicuous. The under surface is smoothly colored, varying from pale ochreous to more yellowish and rarely slightly greenish color. Spots appear sporadically, but are reduced in size and number when they do occur. Immaculate wings seem normal. I have one female in which the band is faintly evident in pale fulvous against a more yellow ground color, extending fully from SC to beyond 1st A. Another has the band incompletely indicated by small brown points against an ochre background tinged slightly with green.

Expanse: male, 33–35 mm., female, 35–38 mm.

Distribution: *Ogallala* was described from specimens taken in eastern Nebraska and western Iowa, but the range should probably be taken as the equivalent of *otloe*'s. The insect flies in late June and July.

I have taken *ogallala* in abundance on virgin prairie lands near Sioux City, Iowa, and have found occasional specimens where cattle had grazed for years. One of my males is pale enough to be called typical *otloe* but several are very dark. These I cannot distinguish from *pawnee* by superficial characters.

The very diffuse appearance of females is characteristic. I have yet to see a female of either species that could not be placed at a glance.

Otloe is a very vigorous flier, perching on elevated flowers and stems where it must be approached with the utmost care. Even then it must be netted with an extremely quick stroke and handled carefully to prevent its being damaged by its own fluttering against the net.

24. *Hesperia pawnee* Dodge. Pl. II, fig. 10; Pl. III, fig. 7, 14, 20, 12; Pl. V, fig. 7, 14, 21.

Hesperia pawnee Dodge, Can. Ent. VI, 44, 1874. Dodge Co., Nebraska.

Macy & Shepard, Butterflies, 208, 1941.

Hesperia pavne Plötz, Stett. ent. Zeit. XLVII, 100, 1886.

Pamphila otloe form *pawnee* Skinner and Williams, Trans. Am. Ent. Soc. L, 179, 1924.

Erynnis pawnee Draudt, Seitz's Macrolep. V, 930, pl. 180 h, i, 1924.

Holland, Butterfly Book, Rev. Ed. 375, pl. LII, fig. 30 (paratype), 31, 1931.

Hesperia ottoe form *pawnee* Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 90, 1931.

Like *ottoe* form *ogallala* the males of this species vary from almost wholly tawny above to darker than average for this genus. I have a few specimens in which the fuscous margin of both wings is reduced almost to nothing. In these specimens the usual spots are very faintly evident, slightly paler than the rest of the wings. From this extreme the species varies to a form with broad dark fuscous margins leaving only small fulvous extradiscal spots and a basal fulvous area extending from the stigma to the costal margin. In such specimens the fulvous discal area of the secondaries may extend only from M_1 to Cu_2 , leaving a fairly wide dark margin into which the fulvous extends sharply on the veins. The distribution of fulvous is generally very variable. Dark lining of the veins also varies greatly. Some dark specimens have the fuscous areas so sprinkled with fulvous scales that they appear peculiarly faded and ruddy.

On the under surface males vary from pale ochreous to a rather bright yellow, sometimes tinged with greenish. Very dark specimens may appear rather brownish. The primaries seem to have a little more black than *ottoe* on the average, and a little more striking pale area near the inner margin. Spots appear on this surface occasionally, varying from a complete row of small whitish points or very vague, scarcely contrasting spots to only a few spots of either type.

The female is wholly fuscous above with a suffusion of fulvous scales varying from a very sparse amount to a heavy wash over the base, costal area and apex of the primaries. The spots of the primaries are mostly well defined and white, while those of the secondaries are restricted but poorly defined and pale fulvous. The under surface has a more greenish tinge than that of the male and often shows a row of small white spots from R to Cu_2 . The single spot between R and M_1 may appear alone but well developed, and other degrees of reduction are found.

Expanse: male, 30–36 mm.; female, 33–38 mm.

Distribution: I have seen specimens ranging from Montana to Texas and eastward into Iowa. Gibbon's records (by letter) of *pawnee* and *ottoe* at Miniota, Manitoba, probably apply to color phases of this species. Males fly from just after the middle of August until well into September, while females do not appear in reasonable numbers until the beginning of the latter month.

Pawnee used to be abundant in virgin prairie near Sioux City, Iowa, and to judge by written statements from the author of the species it was common in his collecting grounds. Like *ottoe* it disappears quickly before grazing and haying and is not likely to be found in well settled regions.

Females are readily distinguished by their sharp contrasting maculation and males, if necessary, by their genitalia, which lack the strong proximal tooth of the valve. The season of flight is, however, quite different from that of *ottoe* so with proper data no confusion need arise.

The strong flight and wary habits of this species make it, like *ottoe*, material for real sport in collecting.

My statements on the northern limit of distribution of *otloe* and *pawnee* are based on the Truman material from Volga, S. D. Dr. Truman was evidently a diligent collector, although careless about labelling. The fact that his collection, now in that of the South Dakota State College, contained a long series of *dacotae* and many specimens of both sexes of *pawnee*, but not a single specimen of *otloe* or its darker form, strongly suggests that he failed to catch *otloe* at all. It should have been on the wing with *dacotae*. My own contribution to errors regarding these species may be responsible for some northern records of *otloe*. It will be possible to check some of these records, but I have not yet done so.

24a. form *montana* Skinner.

Pamphila pawnee subspecies *montana* Skinner, Ent. News XXII, 413, 1911. Colorado.

Pamphila otloe race *montana* Skinner & Williams, Trans. Ent. Soc. Am. L, 179, 1924.

Hesperia otloe race *montana* Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 90, 1931.

Erynnis montana Holland, Butterfly Book, Rev. Ed. 375, pl. LII, fig. 29 (paratype), 1931.

In the Skinner and Williams paper cited above this species is described as follows:

"This is the dark alpine form of the species, the fuscous suffusing the entire wings, leaving only the white spots on the primaries and a row of light spots on the secondaries above; and below the ground color is darker, the light spots are present in the male and conspicuous in the female."

The type and seven paratypes came from several locations in Colorado, ranging from Denver, altitude not stated, to recorded altitudes of 7500 feet. No dates are recorded.

I have not placed *montana* in my own series, although I have specimens of *pawnee* that are every bit as dark as Holland's figure of the paratype. This extreme depth of color and the presence of spots on the under surface strongly favor the association of *montana* with *pawnee* rather than with *otloe*. An additional circumstance that supports this view is the figure of genitalia published by Skinner and Williams, which represents the form found in true *pawnee*. The suggestion that the genitalia of *otloe*, *ogallala*, *pawnee* and *montana* seem to be identical implies that they are of this form. Dr. Skinner could hardly have failed to pick true *montana* as the basis for this statement, but he could easily have failed to pick true *otloe*, since the males are so often identical with those of *pawnee* superficially. There can be little doubt that *montana* is properly placed here. Whether the names *montana* and *ogallala* are worth retaining is quite another point and a matter of opinion.

25. *Hesperia florinda* Butler. Pl. II, fig. 11; Pl. VI, fig. 1, 8.

Pamphila florinda Butler, Cist. Ent. II, 285, 1878.

— *repugnans* Staudinger, in Mem. Romanoff VI, 211, 1892.

Erynnis comma var. *florinda* Elwes & Edwards, Trans. Zool. Soc. Lond. XIV (4), 287, 1897.

Reverdin, Bull. Soc. Lép. Genève IV, 35, pl. 1, fig. 7, pl. 2, fig. 7, 1918.

Like most other species of the genus, *florinda* is variable in the relative extent of fuscous and fulvous on the upper surface, but the two pairs in my possession and my notes on British Museum material lead me to regard it as one of the darker species. My two males have only the basal area of the primaries, the area between stigma and costa, and the transverse row of spots of an average fulvous, and on the secondaries a rather vague discal patch terminating in the row of spots. The females are paler fuscous, due to a considerable sprinkling of fulvous scales over all of the dark parts. This suffusion is most evident on the disc of the secondaries and over the basal and costal areas of the primaries. The spots are small, fairly sharp, and in one of my specimens are much paler on the primaries. The two in the end of the cell of the primaries are elongate and slender.

The overscaling of the under surface is rather heavy and uniform, varying from ochreous or grayish ochreous to greenish ochreous. A fine dark line marks the outer margin of the wings and black points may appear in the fringes. The spots vary from a complete row to none at all. They are paler than the ground color and in the female may be whitish, but as a rule they are small and vague.

Expanse: male, 29-32 mm.; female, 33-35 mm.

Distribution: Japan and eastern Asia, June, July and August. My specific records from the British Museum collection include Japan, Manchuria, Amur and Pekin. Two males from Chita, Transbaikal, July, are much like Japanese specimens and one from Mien-Shan, Shansi, 2000 m., July-August, is very dark.

Within the Eurasian fauna *florinda* is unique in the very inconspicuous maculation of the under surface. The resemblance of males to small dark specimens of *pawnee*, and a possible resemblance between females of *florinda* and *attalus* suggest the need for some care in separating specimens without data. I have been unsuccessful in securing abundant material from collectors for the study of variation. A single male from Yalu, Greater Khingan, N. W. Manchuria, July 23, 1939, is the only specimen secured in this effort.

26. *Hesperia mixta* Alpheraky. Pl. II, fig. 12; Pl. VI, fig. 2, 9, 15, 16.

— *mixta* Alpheraky, Hor. Soc. Ent. Ross. XVI, 432, 1881. Thian-Shan Mts., July, 8-9000 ft.

Pamphila comma var. *lato* Grun Grshimailo, Hor. Soc. Ent. Ross. XXV, 459, 1890. Dshachar Mts.

Reverdin, Bull. Soc. Léop. Genève III (4), 201, 1917.

The reasonably long series of *mixta* in my collection shows as wide a range of variation of the upper surface as any American species. A few males have the fulvous areas dark and restricted to the basal and costal areas of the primaries and very small spots in the usual transverse row across both wings. The fuscous areas are sparsely sprinkled with fulvous scales. Other specimens have the fulvous areas pale and extended, so that only the preapical and extracellular spots of the primaries are isolated against a dark background. The secondaries of these specimens are broadly fulvous, blending gradually to the narrow fuscous

border, and the spots show slightly paler against the similar background. The fringes are pale, sometimes white tipped. Females are similar. I have one specimen that is very dark, with comparatively small spots forming the usual rows and one in the end of each cell. Those of the primaries are very pale, appearing whitish by contrast, and those of the secondaries are pale fulvous. The basal and discal areas are lightly irrorate with fulvous. At the other extreme the fulvous color is pale and washes the entire wing from the base to the row of spots. Most specimens are between the extremes described here.

The under surface also varies extremely in general depth of color but is usually rather dark in appearance. The overscaling varies from ochreous to grayish green and is usually sparse enough to produce a slightly shaggy appearance. The veins are often partly dark, a fine terminal dark line is present, and black dots at the ends of the veins cut into the pale fringes. The spots are usually of moderate size and are white. They show a marked tendency to separation which seems to be a little greater in females. I have one female in which they are reduced to small dots surrounded by black in a dense greenish overscaling.

Expanse: male, 27-33 mm.; female, 30-35 mm.

Distribution: An Asiatic species, apparently like our own western species in its climatic relations. The difficulty of placing the localities on German collectors' labels is troublesome, but I can be certain of a few in my series. On the north Irkutsk, on Lake Baikal, is the most extreme locality. On the west, I have specimens from Narynsk, which I take to be Naryn of the National Geographic Society's maps, in the Soviet State Kirghiz near the border of Sinkiang. Other specimens are from Dsharkend, or Dzharkent, three hundred miles northeast, and the most easterly locality represented is the Nan Shan range, midway between Outer Mongolia and Thibet. My notes on the British Museum material do not extend this range. All dates that I have recorded are between mid-June and the end of July, and the altitude range is from 3000 to 9000 feet. *Mixta* appears to be the most common and widespread Asiatic species, resembling *comma* superficially but differing enough in genitalic structure to be regarded as a separate species. It can be recognized usually by the somewhat shaggy appearance of the under surface together with the tendency of the spots to be separated noticeably, but no definite characters of the wings can be depended upon to separate it from *comma*. The relations of *comma* and *mixta* seem worthy of further study.

27. *Hesperia sassacus* Harris. Pl. II, fig. 13; Pl. VI, fig. 3, 6, 10, 13, 17, 20.

Hesperia sassacus Harris, Ins. Inj. Veg. 3rd ed., 315, 862, Massachusetts.

Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI.

Macy & Shepard, Butterflies, 206, 1941.

Erynnis sassacus Scudder, Butt. E. U. S. II, p. 1641, 1889.

Holland, Butterfly Book 348, pl. XLVI, fig. 13, 1898.

Draudt, Seitz's Macrolep. V, 930, pl. 180 h, 1924.

Holland, Butterfly Book, Rev. Ed. 373, pl. XLVI, fig. 13, pl. LII, fig. 23, 1931.

Erynnis sylvanoides Holland (not Boisduval), Butterfly Book, pl. XLVII, fig. 44, 1898.

Pamphila sassacus Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 126, 1916.

Erynnis sassacus sassacus Clark, Bull. 157, U.S.N.M. 219, pl. 21, fig. 8, 9, 1932.

Average males of *sassacus* have the primaries bright fulvous from near the base to the row of spots, only the extracellular spots being isolated in the fuscous marginal area. The junction between the two colors is fairly well defined. In some specimens the fulvous extends outward in sharp dashes on the veins. In darker specimens the fulvous is contracted to a moderate degree. The secondaries vary from bright fulvous with narrow fuscous costal and outer margins and a broader but paler inner margin to specimens with a restricted fulvous disc. The fulvous often extends in points along the veins and occasionally shows slightly paler spots of the usual band. Females vary in much the same way but I have found them usually darker, with a definite macular band on both wings and elongate spots in the end of the cell of the primaries, and only a moderate suffusion of fulvous on the basal and discal areas. I have one odd specimen, however, that is almost wholly bright fulvous with dashes of this color cutting through the dark outer borders of both wings to the margin.

On the under surface the male has the usual spots large and yellow and the remainder of the secondaries and apical portions of the primaries tinged with gray or brown. The latter color is evidently due to fairly heavy yellow overscaling on a dark background. Although the spots are large they are not contrasting in typical *sassacus* and so are not conspicuous. They are occasionally reduced, forming a restricted band rather than a broad patch, but even then are not clearly evident. The under surface in the female is much the same, although my series shows a tendency to greater contrast between the spots and the rest of the wings. In one specimen the general color of the under surface is very nearly orange.

Expanse: male, 26–30 mm.; female, 29–34 mm.

Distribution: Maine and southern Ontario south into Florida and westward into Iowa. Dates for northern localities range from the third week of May to early July. According to Macy and Shepard it is two-brooded in the South. I have no record of the seasons of flight under these conditions.

Sassacus is easily recognized among the eastern species, and, indeed, among all of the species of *Hesperia* with the exception of *dacotae*. It need not usually be confused with that species, but occasional specimens placed side by side are very much alike. The general brightness and contrast of *sassacus* are quite different from the dull faded appearance and vagueness of *dacotae*.

27a. form *manitoboides* Fletcher.

Pamphila manitoboides Fletcher, Rept. Ent. Soc. Ont. 1888, p. 85, 1889. Nepigon and Sudbury, Ontario.

Barnes & McDunnough, Cont. Nat. Hist. Lep. N.A. III (2), 127, 1916.

Erynnis sassacus var. *manitoboides* Holland, Butterfly Book, Rev. Ed. 373, pl. LII, fig. 21, 1931.

Hesperia sassacus race *manitoboides* Macy & Shepard, Butterflies 206, 1941.

Manitoboides is merely the darkest phase of *sassacus* in which the fulvous of the upper surface is contracted to limited spots and the general color of the under

surface is dark enough to reveal the spots in conspicuous contrast. Some specimens of the species are equally dark above but without such contrasts below.

Although it was described from Ontario, I have no evidence to show that this form predominates in the north. Quite the contrary, my palest specimen is from Albany, New York, and my darkest is from Frederick County, Virginia.

The retention of this name is a contradiction of my principle that specimens which merely represent extremes in a graded series are not worthy of subspecific names. Like other entomologists, however, I find myself reluctant to drop old names even where I should be unwilling to establish them.

28. *Hesperia dacotae* Skinner. Pl. II, fig. 14; Pl. VI, fig. 4, 11, 18.

Pamphila sassacus subspecies *dacotae* Skinner, Ent. News XXII, 412, 1911. Volga, South Dakota.

Hesperia dacotae Lindsey, Bell & Williams, Denison U. Bull., Jn. Sci. Lab. XXVI, 91, 1931. Macy & Shepard, Butterflies, 207, 1941.

Erynnis dakotae Holland, Butterfly Book, Rev. Ed. 374, pl. LII, fig. 22 (paratype), 1931.

Dacotae is one of the rarest, if not the rarest member of the genus. In my series of ten specimens I have included the widest range of variation that I have seen, and it is an extreme range, hence this description must cover many characteristics. The upper surface of one male has the fulvous of the primaries contracted to an average amount over the base, disc and the usual spots and that of the secondaries limited to the discal area, with the spots showing faintly along its outer border. Another male is almost wholly pale fulvous, with only a vague grayish fuscous border on the primaries, scarcely relieving the extracellular spots, and a very narrow dark margin on the secondaries. The remaining three males are intermediate and show a very vague separation between the two colors. Females may be wholly fuscous above, of a pale shade, with very small, vague spots, tending to whitish on the primaries. The spot in the end of the cell very commonly shows its double nature, either separating completely or having two clearly evident nuclei. The palest females that I have seen differ only in having slightly larger spots and an extremely vague fulvous suffusion. The very uncertain definition of the markings on this surface is characteristic.

On the lower surface one of my average males is immaculate, with a rather uniform dull ochreous overscaling. The palest specimen is similar, and the other three have the usual spots. One of them is ochreous with very small and very poorly defined pale spots forming a slender continuous band on the secondaries. Another is yellow, suggesting the under side of *sassacus*, with a similar vague and slender band, and the last, a dwarfed specimen, has somewhat sparse ochreous overscaling and a slightly broader but still very poorly defined band. The under surface of the females is decidedly grayish. In two the band of the secondaries is reduced to a few vague dots, in two it is a continuous band of the usual extent but very vague and slender, and in one it is made up of small but fairly well defined spots.

Expanse: male, 25-32 mm.; female, 30-35 mm.

Distribution: I have identified this species for Mr. Hugh Gibbon from Mini-

ota, Manitoba. Mr. Leussler has taken it near Lake West Okoboji, in Dickinson County, Iowa, and I took a single female in my boyhood at Sioux City. The only other record accurately known to me is the type locality, Volga, S. D., from which my series came, but I have a distinct memory of seeing specimens from the Chicago area, a record which I can some day check more accurately. Macy and Shepard add western and northwestern Minnesota. It was also taken at Grinnell, Iowa, I believe by Parker, who described *Oarisma poweshiek*. The maximum possible range would therefore appear to be the prairie region from Manitoba south into central Iowa and eastward to the tip of Lake Michigan. *Dacotae* flies from late June to late July.

Everywhere *dacotae* is reported as rare. Apparently Dr. Truman, who caught the type series, alone has taken it in reasonable numbers. The fact that Dickinson County was a land of lakes and kettle holes in the days when Mr. Leussler caught his series, and the added circumstance that my one specimen was taken in a swale bounded by woodlands leads me to think of it as a species to be sought in wet prairies. I hope some day to test this theory, but the shrinkage of the prairies in Iowa has been so rapid that the opportunity may never come. Since the species has never been found plentiful it will probably give way as rapidly as any before the advance of agriculture.

It is greatly to be hoped that collectors living within its range will give some attention to any virgin prairie remaining in their reach in the hope of locating it.

PLATES

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PLATE I

MALE GENITALIA

1. *H. uncas* Reakirt
2. *H. benuncas* Oberthür
3. *H. melea* Scudder
4. *H. comma* Linnaeus (Switzerland)
5. *H. comma* Linnaeus (Trautenau)
6. *H. borealis* n. sp.
7. *H. laurentina* Lyman
8. *H. manitoba* Scudder
9. *H. hulderti* Lindsey
10. *H. colorado* Scudder
11. *H. harpalus leussleri* Lindsey
12. *H. dodgei* Bell
13. *H. lindseyi* Holland
14. *H. columbia* Scudder
15. *H. juba* Scudder

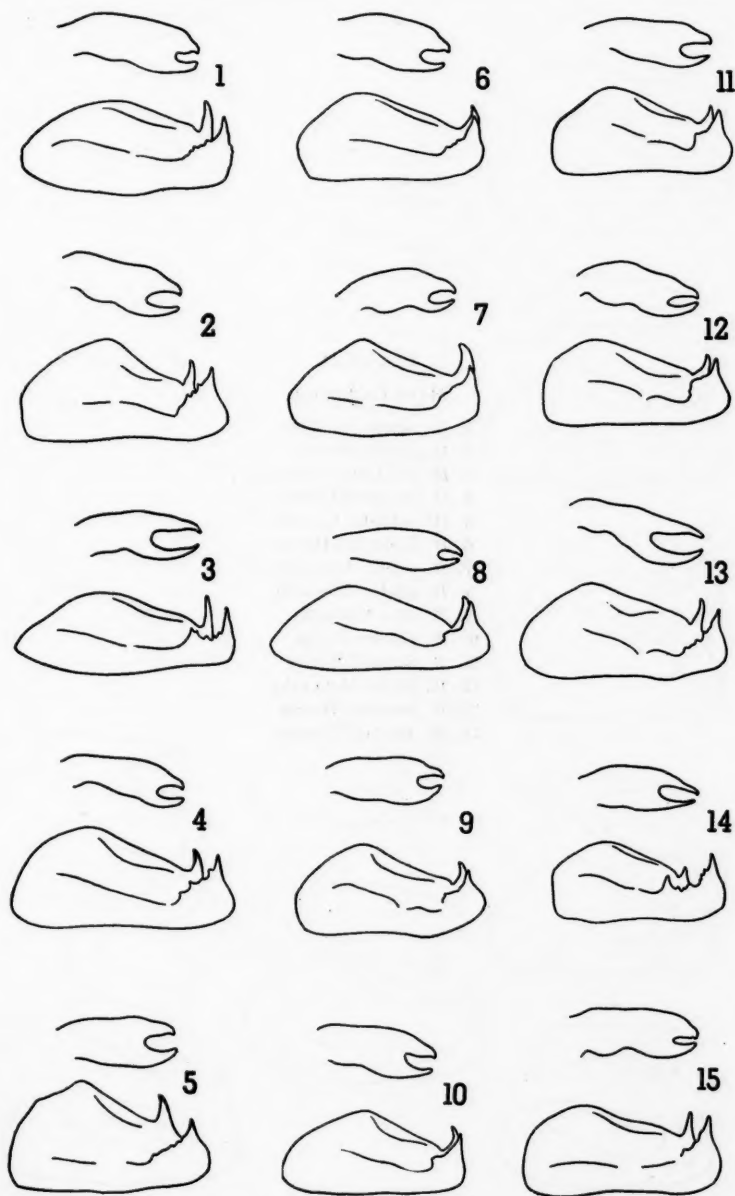


PLATE II

MALE GENITALIA

1. *H. nevada* Seudder
2. *H. dimila* Moore
3. *H. woodgatei* Williams
4. *H. viridis* Edwards
5. *H. pahaska* Leussler
6. *H. leonardus* Harris
7. *H. meskei* Edwards
8. *H. attalus* Edwards
9. *H. ottoe* Edwards
10. *H. pawnee* Dodge
11. *H. florinda* Butler
12. *H. mixta* Alpheraky
13. *H. sassacus* Harris
14. *H. dacotae* Skinner

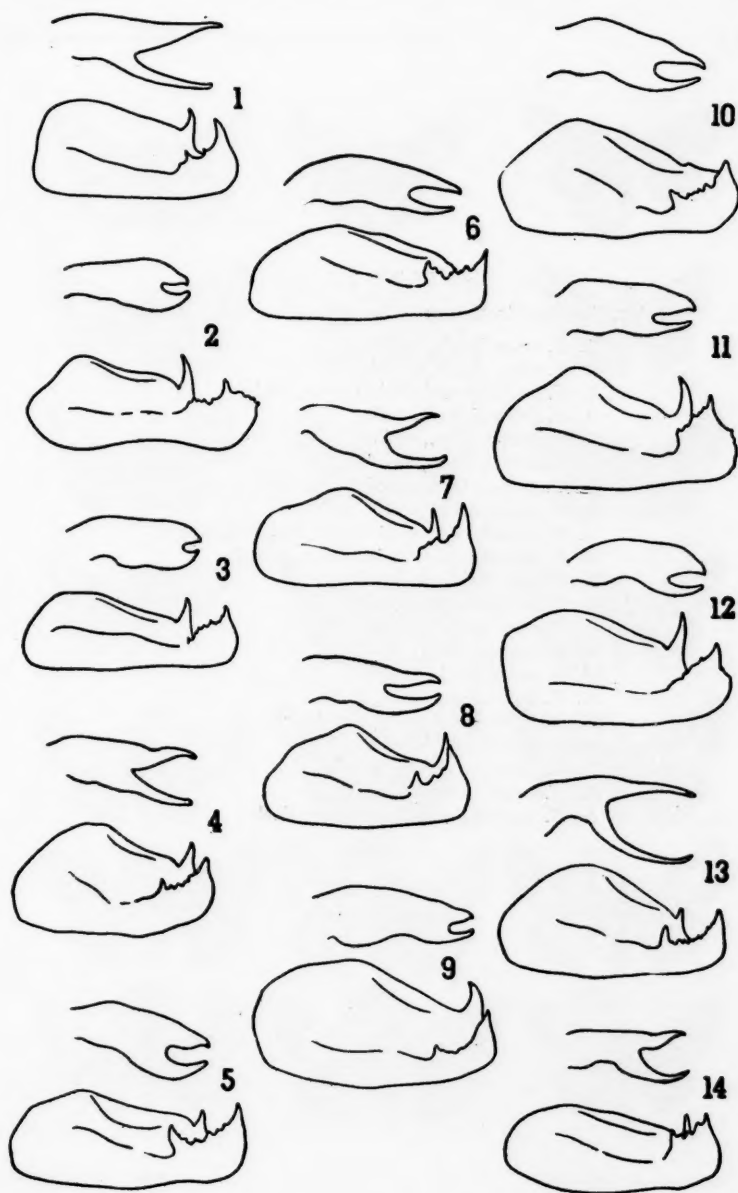
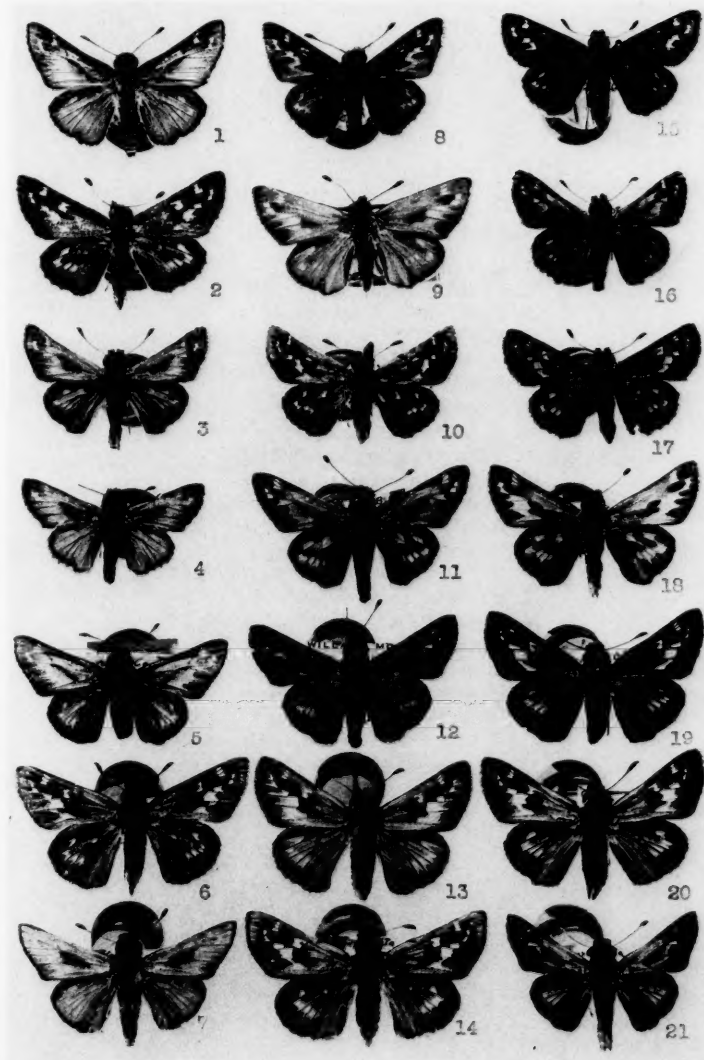


PLATE III

ALL FIGURES SHOW THE UPPER SURFACE. NATURAL SIZE

1. *H. uncas* Reak., male
2. *H. uncas* Reak., female
3. *H. harpalus assiniboia* Lyman, male
4. *H. lindseyi* Holl., male
5. *H. attalus* Edw., male
6. *H. attalus* Edw., female
7. *H. pawnee* Dodge, male, very pale
8. *H. metea* Scud., male
9. *H. pahaska williamsi* Linds., female paratype
10. *H. harpalus assiniboia* Lyman, female
11. *H. juba* Scud., male
12. *H. leonardus* Harr., male
13. *H. ottoe ogallala* Leuss., female
14. *H. pawnee* Dodge, female
15. *H. metea* Scud., female
16. *H. laurentina* Lyman, male
17. *H. laurentina* Lyman, female
18. *H. juba* Scud., female
19. *H. leonardus* Harr., female
20. *H. pawnee* Dodge, female
21. *H. pawnee* Dodge, male, very dark



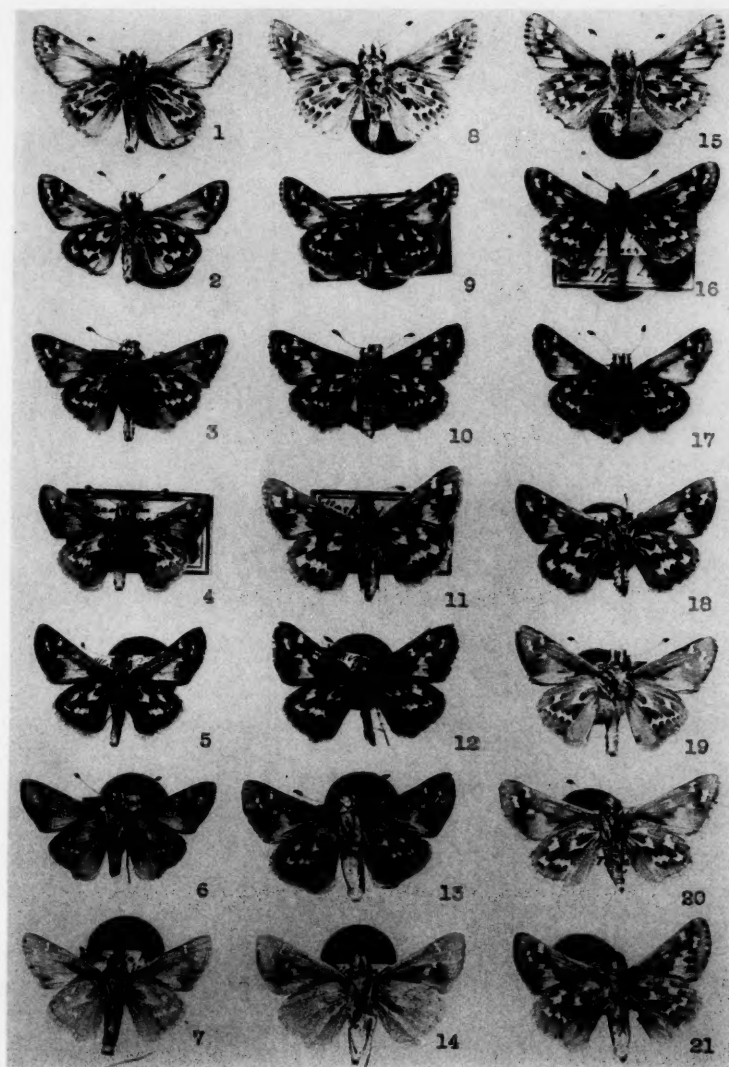
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REVISION OF HESPERIA

PLATE IV

ALL FIGURES SHOW THE UNDER SURFACE. NATURAL SIZE

1. *H. uncas* Reak., male
2. *H. nevada* Seud., male
3. *H. laurentina* Lyman, male
4. *H. hulbirti* Linds., male paratype
5. *H. colorado* Seud., male
6. *H. harpalus* Edw., male
7. *H. harpalus assiniboia* Lyman, male
8. *H. benuncas* Obth., male
9. *H. borealis* n.sp., male holotype
10. *H. laurentina* Lyman, female
11. *H. hulbirti* Linds., female paratype
12. *H. colorado* Seud., female
13. *H. harpalus* Edw., female
14. *H. harpalus assiniboia* Lyman, female
15. *H. comma* Linn., female
16. *H. borealis* n.sp., female allotype
17. *H. manitoba* Seud., male
18. *H. manitoba* Seud., female
19. *H. harpalus idaho* Edw., male
20. *H. harpalus idaho* Edw., female
21. *H. harpalus assiniboia* Lyman, female



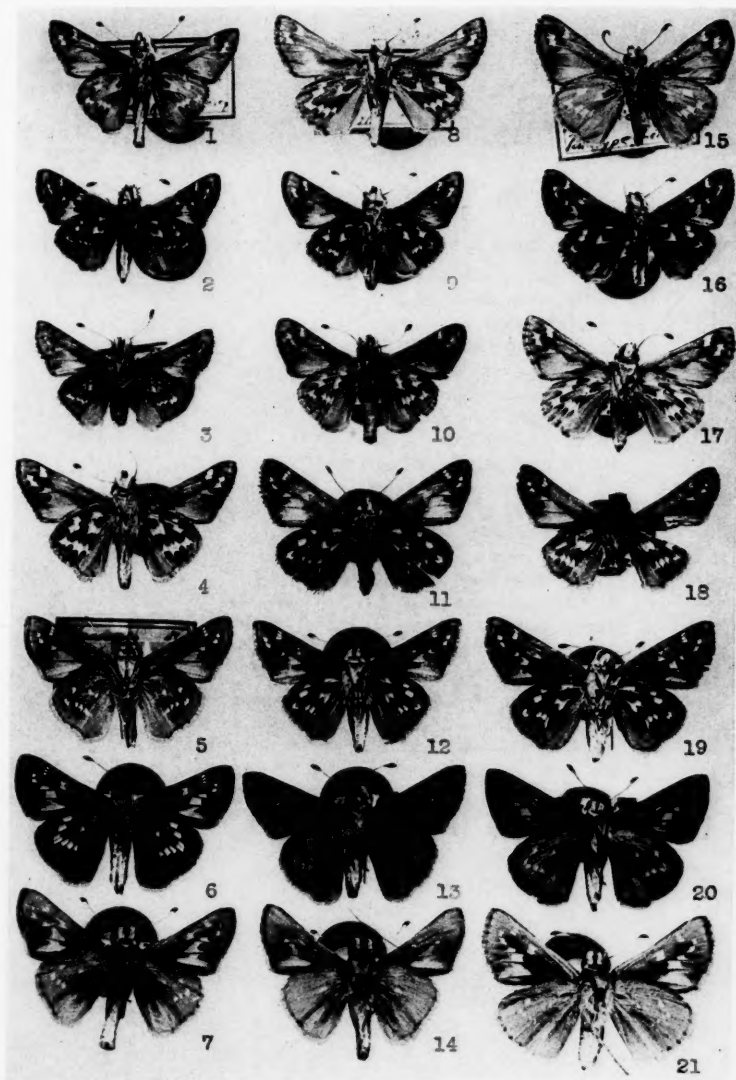
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PLATE V

ALL FIGURES SHOW THE UNDER SURFACE. NATURAL SIZE

1. *H. harpalus leussleri* Linds., male holotype
2. *H. dodgei* Bell, male
3. *H. columbia* Edw., male
4. *H. juba* Scud., male
5. *H. pahaska williamsi* Linds., male paratype
6. *H. leonardus* Harr., female
7. *H. pawnee* Dodge, male
8. *H. harpalus leussleri* Linds., female allotype
9. *H. dodgei* Bell, male
10. *H. lindseyi* Holl., male
11. *H. woodgatei* Wms., female
12. *H. viridis* Edw., male
13. *H. meskei* Edw., male
14. *H. pawnee* Dodge, male
15. *H. harpalus ochracea* Linds., male paratype
16. *H. dodgei* Bell, female
17. *H. lindseyi* Holl., female
18. *H. pahaska* Leuss., male
19. *H. viridis* Edw., female
20. *H. meskei* Edw., female
21. *H. pawnee* Dodge, female



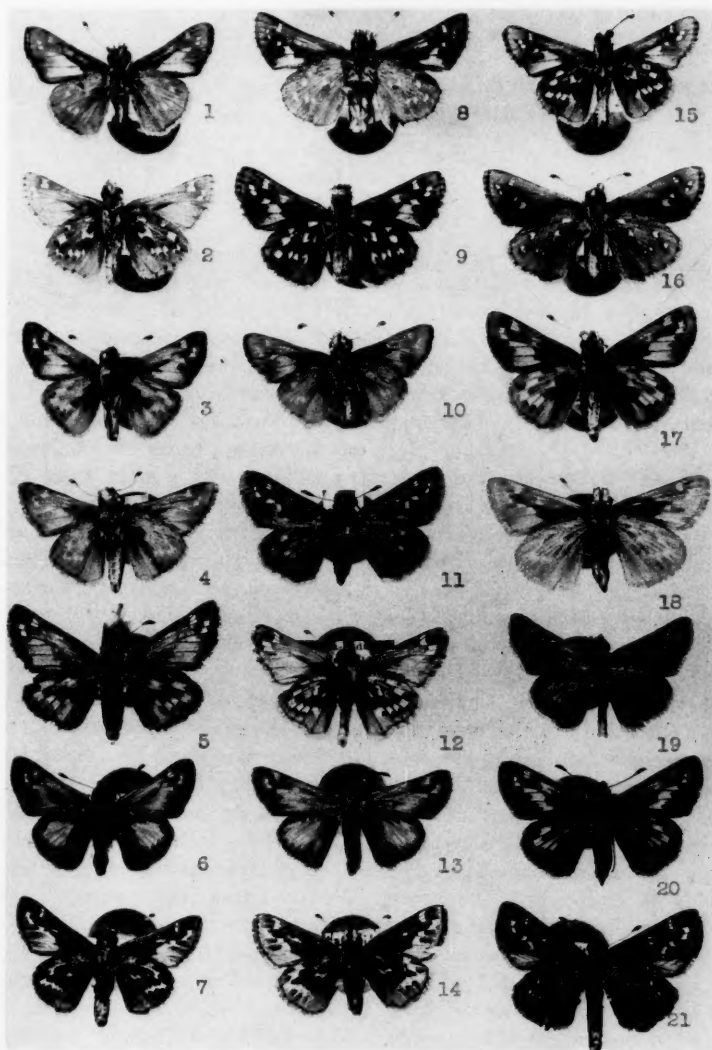
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REVISION OF HESPERIA

PLATE VI

FIGURES REPRESENT THE UNDER SURFACE UNLESS OTHERWISE STATED. NATURAL SIZE

1. *H. florinda* Butl., male
2. *H. mixta* Alph., male
3. *H. sassacus* Harr., male
4. *H. dacotae* Skin., male
5. *H. nevada* Scud., female, upper surface
6. *H. sassacus* Harr., male, upper surface
7. *H. metea* Scud., male
8. *H. florinda* Butl., female
9. *H. mixta* Alph., female
10. *H. sassacus* Harr., male
11. *H. dacotae* Skin., female, upper surface
12. *H. dimila* Mre., male
13. *H. sassacus* Harr., female, upper surface
14. *H. metea* Scud., female
15. *H. mixta* Alph., male
16. *H. mixta* Alph., female
17. *H. sassacus* Harr., female
18. *H. dacotae* Skin., female
19. *H. benuncas pallida* Stgr., male, upper surface
20. *H. sassacus* Harr., female, upper surface
21. *H. metea* Scud., female



ARTHUR WARD LINDSEY

REVISION OF HESPERIA

THE GROWTH OF THE TOURIST COURT IN THE UNITED STATES AND ITS RELATIONSHIP TO THE URBAN DEVELOPMENT OF ALBUQUERQUE, NEW MEXICO

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INTRODUCTION

Thirty years ago the automobile tourist court, more commonly known simply as "tourist court," did not exist. Today it is found in every state in the United States and does a gross business of more than \$36,000,000 a year.¹ It has sprung up along our highways like a mushroom in the early fall and, unlike that short-lived fungus, has sent down deep roots and become perennial. In at least one city, Albuquerque, New Mexico, it has appeared in such numbers as to influence appreciably the growth pattern of the city.

In many parts of the country, particularly in southwestern United States, it has become an integral part of the American scene. If Messrs. Currier and Ives, those indefatigable recorders of typical aspects of nineteenth century America, were practicing their art today, they would be compelled to include it as a companion piece to the automobile.

In spite of its numbers and large gross income, in spite of its typically American aspect, the tourist court is known to comparatively few people. This must be set down to certain limitations inherent in its business organization. The tourist court caters primarily to a special type of customer, the automobile tourist, and not to the buying public as a whole. Furthermore, as a rule, each tourist court is a comparatively small, individual enterprise, one of the few extant examples of that display of initiative on the part of the small business man which has played so important a part in the development of this country. It seems almost inevitable that in time there will be large and powerful tourist court chains, each under a single management, as there are chain hotels and chain grocery stores, with consequent increase in purchasing power and loss of individuality. In fact, this tendency toward amalgamation has already begun to manifest itself through both individual and corporate ownership of small chains.² Six of the twelve Alamo Plaza Courts in Texas are controlled by Lee Torrance of Waco, Texas, and his son-in-law. The National Affiliated Hotels of Texas own eight tourist courts and the Hull Hotel Chain of California operates six, presumably as a canny hedge against potential competition from this quarter. However, chain ownership is the exception. The great majority of the tourist courts are operated as individual enterprises and the tourist court business remains a vast collection of

¹ *Infra*, p. 54.

² *Tourist Court Journal*, personal communication, March 3, 1942.

small businesses. Yet it is integrated to a certain extent by the American Tourist Court Association and the *Tourist Court Journal*³ which serve a useful function by advertising the tourist court and encouraging and facilitating ready interchange of ideas.

"Tourist court" is the current name for the now out-moded "auto camp." Early examples of this phenomenon in Albuquerque were called "camp" and the name was usually elaborated so as to stress the merits of the camp, as Open Air Camp, Paramount Camp, Mountain View Camp. In recent years, the name "camp" has given place to more pretentious titles, as auto court, motel, motel court, lodge, motor lodge. The great majority of the courts in Albuquerque are U-shaped and consequently possess a central court (see Fig. 1). Presumably on this account they are generally known simply as "courts," sometimes with the addition of some appropriately descriptive term, often in Spanish, as Tower Court, Pueblo Bonito (beautiful village) Court, La Posada (the hotel) Court. Texas Ann Court (see Fig. 1) was obviously named with a view to attracting the Texas trade.

It was almost inevitable that the first courts should have been called "camps," for they grew out of the American practice of "camping out." When people first began to travel the cross-continental trails in automobiles, they carried camping equipment as a matter of course. No one could predict when a car would break down or the road prove impassable because of mud, sand, washout or other natural hazard. The trip was an adventure, the camping out part of the adventure. This proved to be so popular a method of travel that soon the western roads were infested with "tin-can"⁴ tourists. Free municipal camping places were instituted to take care of a threatened nuisance. Private individuals, seeing their golden opportunity in this same nuisance, opened their own camping grounds and began to bid for the business. The crowded, neglected municipal grounds early lost customers to the well-tended private camping grounds despite the fee charged by the latter.

It seems likely that the private camping grounds owed much to the American soldiers who were discharged from the service in 1918.⁵ Many of these soldiers had little money and no jobs. Others could return to the old job but found themselves restless and filled with a high distaste for the pre-war routine. The call of the open road proved irresistible to them for they saw there an opportunity to see the country and, at the same time, look for a job or a new job. They were used to camping out and anxious to save money. The camping grounds were ideally suited to their purpose and they used them extensively.

Though there is room for a reasonable difference of opinion as to the ultimate

³ Published monthly by the Tourist Court Journal Company of Temple, Texas.

⁴ Formerly the term "tin-can" referred exclusively to the patched and dilapidated vehicle in which the tourist rode, particularly the cherished Model-T-Ford of blessed memory whose usefulness could be prolonged indefinitely by the judicious application of bailing wire. Lately the term has been taken over by trailer owners and users. One association of confirmed trailer addicts is known as the "Tin-Can Tourists of America."

⁵ *Tourist Court Journal*, vol. 5, no. 5, p. 5, February, 1942.

importance of the patronage of the soldiers, it seems clear that there was increasingly heavy demand for this type of accomodation. The private camping ground, driven by the competition of other private camping grounds, soon began to erect rude cottages to relieve the tourist of the necessity of carrying a tent, and the auto camp in its primitive state was born. Stoves, beds, and bed linen were put into the cottages to replace the camp stove, cot, and bedroll of the camper. Sanitary toilet and bathing facilities became immediately necessary and buildings were put up to take care of these needs.

The practice of constructing cottages, usually with attached shed for the car, around a court containing a central building which housed common sanitary toilets, showers, and washtubs became standard procedure (see Fig. 2a).

As the demand for better accomodations grew, cottages were provided with individual toilet and bath and more elaborate furnishings. This necessitated hot running water in the cottages, which in turn encouraged the installation of central heating.

An establishment so pretentious demanded a new name, and common sense dictated the term "court" as being both dignified and suggestive of the plan on which the establishment was built. It is to the credit of the industry that the majority of the courts in Albuquerque and elsewhere have restricted themselves to this term.

DEVELOPMENT OF THE TOURIST COURT AS A NATIONAL INSTITUTION

The development of the tourist court in the United States bears striking resemblance to that of the hotel. Both paralleled the development of a new method of transportation. The hotel grew with the railroad, the tourist court with the automobile.

The American hotel, as distinct from the American inn and tavern which was modeled on its European counterpart, saw its initial great development in the thirty years preceding the Civil War.⁶ Williamson discusses several reasons for this growth, which are valid as far as they go, but he fails to mention one of fundamental importance, namely, the growth of the railroads. It is more than mere co-incidence that the first marked expansion of the hotel should have taken place at the same time as that of the railroad. First demonstrated to be a success in England in 1830,⁷ the railroad developed with great rapidity on our eastern seaboard between 1830 and 1860 and the hotel with it. It is no doubt true that the American habit of living in hotels, the American tendency to roam widely, the democratic ideal of comfort for all, the use of the hotel as a social center by the American public, and the application of stock-company financing to hotel construction aided and abetted the growth of the modern American hotel, but that growth must, to a large extent, have been dependent on the growth of the railroad. The best evidence for this statement is the existence of the "rail-road hotel," once a much more flourishing institution than at present.

⁶ JEFFERSON WILLIAMSON, *The American Hotel*, New York, Knopf, 1930, pp. 8-10.

⁷ EDWARD C. KIRKLAND, *A History of American Economic Life*, New York, Crofts, 1939, pp. 277-283.

The tourist court sprang into existence at the behest of the automobile. Its growth has been directly, though not necessarily exactly, proportional to the growth in the efficiency of the automobile and the increase in the number of hard-surfaced roads which spread their intricate network across the face of the country. Percival⁸ points out that in 1895 there was not a single mile of paved rural highway in the United States and that the first motor car registration, made the same year, showed only four cars in the whole United States. The earliest tourist court on record was a municipal camp consisting of half a dozen shacks.⁹ It was put up in 1913 by the town of Douglas, Arizona, to take care of motorists who had become a camping nuisance to the community. From that time to the present, the tourist court has had an amazingly rapid and vigorous growth. A nation-wide census,¹⁰ made in 1936, shows that 9,848 tourist courts did a gross business of \$24,300,000 in the calendar year 1935. A similar census,¹¹ made in 1940, shows that 13,521 tourist courts did a gross business of \$36,786,000 in the calendar year 1939. The basis on which the census was taken indicates how conservative these figures must be. Each census specifically *excluded* tourist homes, tourist camps operated by communities, cottage colonies catering to vacationists rather than to tourists, and tourist camp enterprises engaged primarily in conducting a retail business such as a restaurant or filling station. The growth of a new enterprise from one that did zero business in 1912 to one that did \$24,300,000 worth of business in 1935 is truly remarkable. The continued vigor of its growth is attested by the fact that in 1939 it did half again as much business as in 1935.

The rapidity and vigor of the growth of the tourist court from 1913 to 1940 are not so surprising, however, when viewed in the light of the tremendous increase in the efficiency of automobiles and roads during that period. From 1913 to 1935, the tourist court was simply trying to keep pace with such fundamental changes in automotive design and engineering as were evidenced by the advance from *Model T* to *V8* in the Ford line and the revolutionary change in highway construction marked by the progression from local dirt road to paved transcontinental highway. Since 1935, numerous refinements in automotive engineering coupled with the increased use of concrete in highways and increased efficiency in the application of a black-top surface to the gravel road have raised the comfortable cruising speed of the automobile from 45 to 60 miles an hour. This has shortened materially the length of time required to drive from coast to coast and in like measure has encouraged cross-country travel.

The improvement in the quality of the accommodations offered by the tourist courts in the last five or six years is perhaps an even more important reason for

⁸ C. C. PERCIVAL, "Putting big business on the highways: pioneer touring," *Nation's Business* 26: 20-22, September, 1938.

⁹ "America takes to the motor court," *Business Week*, June 15, 1940, p. 19.

¹⁰ U. S. Bureau of the Census; Census of business: 1935 (vol. 8, pt. 6), *Tourist camps*, Washington, 1937

¹¹ U. S. Bureau of the Census; Census of business: 1939, *Tourist courts and tourist camps*, Preliminary Summary, April 2, 1941, p. 1.

the recent increase in business. It is this period which has seen the advent of the more luxurious tourist court in quantity, offering for the first time accommodations comparable to those of a first-class hotel. The difference between the old type of tourist court and the new is graphically illustrated by the two photographs of Lincoln Court, Cheyenne, Wyoming, taken in 1936 (Fig. 2a) and 1941 (Fig. 2b). This court¹² was established in 1930. In 1936, though it had undergone constant remodeling, it was still old-style, characterized by a building within the court containing "showers—ladies" and "showers—gents." The cabins, modern by the standards of that day, were still hardly more than shelters from the weather. The main building was disfigured by large letters advertising the various services offered by the court. There was some attempt at landscaping but much remained to be done. Since 1936 individual bathrooms (Fig. 2c) and floor furnaces have been installed, rooms have been completely refurnished (Fig. 2d) and apartments consisting of two or three rooms and bath have been added. There is now a central lobby (Fig. 2e) where guests may congregate and relax, and the grounds have been attractively landscaped (Fig. 2b) with the assistance of the State Highway Department. The tourist court has equalled and, in some respects, surpassed the hotel.

There is nothing at present, aside from war, to indicate that the tourist courts have stopped increasing in number or improving the quality of their appointments. On the contrary, *Business Week*¹³ has estimated that, as of June 15, 1940, new tourist courts were being built at the rate of 800 per year, some, as Coronado Courts at Galveston, Texas, at a cost of \$350,000.

The precise effect of the current World War on the present rate of growth of the tourist court is not yet apparent. The immediate effect may be to cut off growth altogether for the duration of the war. This is foreshadowed by recent restrictions imposed by the federal government on the sale of tires and new cars. It seems likely that this will decrease travel by private automobile and increase travel by bus and train, thereby increasing hotel trade and decreasing tourist court trade. It seems equally probable that with the cessation of hostilities and a return to "business as usual" the tourist court will resume its normal rate of growth. In fact, the trend up to the present time indicates that the period of greatest growth for the tourist court lies ahead in the period of peace which must eventually come to pass.

There is good ground for believing that the late depression contributed largely both to the number and to the quality of tourist courts¹⁴ by increasing the number of patrons and bringing in patrons who were used to first-class accommodations. The courts offered reasonable accommodations and, in addition, no charge was made for garage. Furthermore, there was no tipping. Today first-class tourist courts offer these and enough other advantages to attract tourists though the price for accommodations be equal to that of a first-class hotel.

¹² HARRY R. SMITH, "Forty Acres of Wyoming," *Tourist Court Journal*, vol. 5, no. 5, pp. 8-10, February, 1942.

¹³ "America takes to the motor court," p. 19.

¹⁴ "America takes to the motor court," p. 20.

Whatever the price may be, it still includes garage and there is no tipping. Both features have a strong appeal for the average American tourist. So does the presence of the garage next to and adjoining his cabin. To reach his car he simply steps into the next room. This enables him to unload his luggage in rainy weather without getting wet, to retrieve a forgotten piece of luggage easily, and to run into town in the late evening or make an early morning start with a minimum of fuss and bother. The tourist court is apt to be located on the edge of town while the hotel is in the center of the downtown business district. This difference in location, together with the fact that every cabin has good cross-ventilation as soon as window and front door are thrown open, means that the average tourist cabin is cooler in summer than the average hotel room. This is a not inconsiderable item to the tourist who has just spent a long day under the broiling sun. The hotel's answer to this challenge is air-conditioning, but many tourists are still unable to accustom themselves to this often abrupt change in temperature.

There are still other advantages possessed by the tourist court which are worth recording. When the tourist registers at a tourist court, he has a chance to inspect his cabin before signing for it. He simply pulls up at the office door and an attendant comes out and directs him to a vacant cabin. Then his wife may inspect it and finish registering while he unloads the car. When he puts up at a hotel, he trails across a well-kept lobby, feeling bedraggled in his dusty clothes and conspicuous on account of the disreputable character of the miscellaneous luggage he has managed to collect in the course of the trip. Then he registers for a room sight unseen. This difference in convenience of registration is especially important to a family that includes several children. Furthermore, the first-class tourist court has a well-kept, grassy lawn around which its cabins are built, with easy chairs and a playground. Here the tourist can relax after he has moved into his cabin and chat with fellow tourists about the state of the roads and other mutually important matters. Here the children can stretch their cramped limbs and amuse themselves without the ever-alert supervision of grown-ups necessary in a hotel.

Although this brief comparison of tourist court and hotel may seem to give the edge to the tourist court, this is not necessarily true. It must be at once apparent that the advantages possessed by the tourist court are largely operative during the summer only and appeal to particular classes of persons.

The good hotels and the first-class tourist courts appeal on a competitive basis primarily to three classes of travelers: well-to-do tourists, commercial travelers, and business men on trips. Here the hotels have the edge because they offer a larger number of high quality rooms, complete service (porter, bell-boy, messenger, telephone and telegraph), better dining facilities, and easier access to the local business and shopping areas. In addition, they either sell, or house shops that sell, newspapers, magazines, drugs, haberdashery, and other minor luxuries dear to the heart of the affluent traveler. Armed with these advantages, the good hotels offer formidable competition to the first-class tourist courts at any season but particularly during the winter months when the weather is bad.

The tourist court, first-class or otherwise, has a special appeal for the family on tour, as already indicated. It also attracts the poor tourist or the tourist in moderate circumstances. For him, the advantages of the hotel are really disadvantages to be avoided because they constitute a considerable drain on his slender resources. Furthermore, the tourist court has a special appeal for workmen and their families in temporary employment or seeking work, and for new arrivals in town looking for permanent homes. These people are neither transients nor permanent residents, neither well-suited to a hotel or a house of their own, and for them the tourist court offering a cabin at a weekly or monthly rate is often the perfect answer to a distressing problem. Some courts specialize in these semi-permanent residents and constitute a new link between such temporary lodgings as the hotel and the ordinary tourist court on the one hand and the permanent residence afforded by the apartment house on the other.

GEOGRAPHIC INFLUENCES ON THE DISTRIBUTION OF TOURIST COURTS IN THE UNITED STATES

Although tourist courts are found in every state in the Union, they are by no means distributed uniformly throughout the country. Tables I and II indicate that their native habitat is west of the Mississippi River and that they flourish best in the semi-arid Southwest. In New England and New York the tourist home bids for a large share of the tourist trade. In the Middle West and South both types are met with in many cities and towns.

The reasons for this lack of uniformity of distribution are complex and cannot be examined here in detail. Chief among them are the relative availability of substantial houses for tourist homes and the nature of the climate.

The tourist home entered the field primarily as a part-time enterprise to enable some member of the family, usually the wife, to earn pin money. It took firmest hold in those areas where thrifty families live in substantial, well-built houses. The most typical of these areas are the small towns and rural districts of New England and New York. They became and remain today the center of the tourist home trade although tourist homes flourish wherever similar conditions are found, particularly in the Middle West. Household expenses are little increased by taking in tourists and the money so earned is largely profit. Dorothy Canfield Fisher has written a delightful little play on this theme¹⁵ wherein a Vermont family decides to take in tourists in order to get money to send a daughter to Normal School. Mrs. Fisher makes one of her characters say¹⁶ "There's money in it—if you do your own washings and all, and you can use up your broilers and garden truck and preserves and eggs and milk." Inasmuch as the play grew out of the collective experience of a Vermont community, we may regard Mrs. Fisher's account of the headaches, the work, the amusement, and the good fellowship which the tourists furnished, in addition to cash, as essentially true to fact.

¹⁵ DOROTHY CANFIELD FISHER, *Tourists Accommodated*, New York, Harcourt, Brace and Company, 1932, 90 pages.

¹⁶ FISHER, *Tourists Accommodated*, p. 18.

West of the Mississippi River there are comparatively few homes of the quality found in New England and New York available for tourist homes. Moreover, the tradition of camping out has always been much stronger in the West than in the East. This combination of factors, together with the nature of the climate, has made inevitable another solution for the problem of providing accommodations better than possible in camping out and cheaper than those offered by the hotel. That solution has proved to be the tourist court.

It is not surprising that the first shelters on record should have been erected in the semi-arid Southwest, at Douglas, Arizona,¹⁷ for there the warm, dry climate permitted economical construction. It was not necessary to provide heat or a cellar, and wood did not rot easily. It was only necessary to provide protection from sun and rain.

TABLE I.—1935

Compiled from U. S. Bureau of the census; Census of business: 1935, vol. 8, pt. 6, Table 1, *Tourist camps*, Washington, 1937

	GROSS RECEIPTS	NUMBER OF COURTS
California.....	\$4,951,000	1,440
Texas.....	2,569,000	971
Arizona.....	1,048,000	308
New York.....	860,000	389
Oregon.....	812,000	386
New Mexico.....	791,000	213
Colorado.....	781,000	413
Washington.....	751,000	317
Maine.....	695,000	301
Florida.....	558,000	252
New Hampshire.....	526,000	204
Missouri.....	429,000	263
Wisconsin.....	422,000	289
Minnesota.....	411,000	408
Oklahoma.....	390,000	216
Total.....	\$15,994,000	6,370

Tables I and II indicate that it is the semi-arid states which, on the whole, have profited most from the tourist court business. In both tables, the fifteen states having the most tourist courts at the date given are arranged in the order of the gross income of each. In each table, five of these fifteen states, Arizona, California, Colorado, New Mexico, and Texas are semi-arid in whole or in part. In both 1935 and 1939, California and Texas far outstripped the other thirteen states in number of courts and gross receipts. In 1935 and 1939, the five semi-arid states were among the first seven in gross receipts. This predominance of the semi-arid states in gross receipts and, to a lesser degree, in the number of courts can hardly be wholly accidental. No doubt factors other than climate

¹⁷ *Supra*, p. 54.

help account for this predominance yet the importance of the warm, dry climate is inescapable.

The differences between the two tables indicate that other geographic influences may affect the distribution of tourist courts to a greater degree in other parts of the country. Oklahoma and New Hampshire have been pushed off the 1939 table by Michigan and Montana. Oklahoma had two courts less in 1939 than in 1935, but the fewer courts did more business; 216 courts did a gross business of \$390,000 in 1935 whereas 214 courts did a gross business of \$410,000 in 1939. In spite of this gain in revenue, Oklahoma was unable to win a place in Table II. New Hampshire shows marked decline in both number of courts and gross receipts. New Hampshire lost 39 courts in the four-year period and the

TABLE II.—1939

Compiled from U. S. Bureau of the census; Census of business: 1939, *Tourist courts and tourist camps*, Preliminary Summary, April 2, 1941, p. 2

	GROSS RECEIPTS	NUMBER OF COURTS
California.....	\$7,959,000	2,081
Texas.....	4,591,000	1,392
Florida.....	1,797,000	562
Oregon.....	1,275,000	528
Arizona.....	1,267,000	370
Colorado.....	1,113,000	571
New Mexico.....	1,073,000	274
Minnesota.....	1,058,000	765
New York.....	1,026,000	688
Washington.....	993,000	517
Maine.....	951,000	449
Missouri.....	747,000	310
Wisconsin.....	559,000	407
Michigan.....	518,000	436
Montana.....	494,000	246
Total.....	\$25,421,000	9,596

decreased number did \$70,000 less business in 1939 than in 1935. The marked growth shown by Florida, Michigan, and Montana and the equally marked decline of New Hampshire raise complex geographic problems which are beyond the scope of this paper.

ALBUQUERQUE, A RAILROAD TOWN, AND THE BEGINNING OF THE CRUCIFORM PLAN

The urban pattern of Albuquerque, the principal city of New Mexico, was dominantly cruciform in the early days of the town's industrialization, just as it is today. The present cross is not altogether the same cross the railroad created (see Figs. 3, 5) but the pattern was initiated then. A native son has already called attention to this form and the way it grew.¹⁸

¹⁸ HARVEY FERGUSON, *Rio Grande*, New York, Knopf, 1933, p. 275.

New Town was built around the railroad and the shops. It was called a railroad town and rightly so. . . . It began with the railroad station and reached a single wide street toward the Old Town. Another street paralleled the tracks so that the Town had roughly the form of a cross.

The north-south arms of the original cross lay on First and Second Streets, the two north-south streets just west of the Santa Fe railroad. These were the arms containing the business area with stores and saloons. Business tended to spread with about equal vigor north and south of the railroad station so that these arms, from the beginning, have constituted themselves cross-arms.

The east-west arms lay along Railroad Avenue, later dignified as Central Avenue in a burst of civic pride, now reduced to Highway 66 on Figures 3, 5. It was lined with stores for one block east and four blocks west of the railroad. Beyond these limits it was a dusty road, with only an occasional dwelling house along its length, leading to the University on the east and to Old Town on the west. These two arms grew irregularly and have always been of unequal length. For a long time the east one grew hardly at all. Nor would the west one have shown greater immediate growth had it not been for the presence of Old Town. New Town and Old Town were then separate entities. A horse car traversed the mile and a half to Old Town largely because the presence of the county courthouse there created traffic in that direction.

Dust roads stretched north and south of New Town as well as east and west. There were two crossings of the Rio Grande, both fords and not bridges. One was just south of New Town at the Brelas Bridge on what is now Highway 85 (see Fig. 3); the other was at a point six miles north of New Town near the town of Alameda. Thus the region west of the Rio Grande could be reached most easily by traversing the north-south arms of the cross, and this traffic helped to re-inforce the railroad in making these arms dominant in the town pattern.

ALBUQUERQUE, A HIGHWAY CENTER, AND THE DEVELOPMENT OF THE CRUCIFORM PLAN

The urban pattern of Albuquerque is still dominantly cruciform, but the shape of the cross is somewhat different from that which developed when the railroad first came to town. To the original cross has been added a second pair of cross-arms reaching out on Fourth Street north and south of Central Avenue, along Highway 85, representing extension of the business core of the city there (see Figs. 3, 5). The Latin cross has been superseded by the Patriarchal cross. The business center of Albuquerque has moved from the intersection of the railroad and Central Avenue to the intersection of Central Avenue and Fourth Street. The retention of the old north-south cross-arms along the railroad is due to the continuing importance of the railroad in the life of the town. The retention of the old east-west cross-arms along Central Avenue is due to the inertia of old business, the growth of new business incident to suburban development in the vicinity of the University of New Mexico, and to the routing of Highway 66 along Central Avenue. The growth of the new north-south cross-arms along Fourth Street is due in large measure to the presence of Highway 85, which has attracted

filling stations, garages, and restaurants which cater to the tourist trade. The westward shift of the business center along Central Avenue from the railroad to Fourth Street is due in part to the natural desire of retail business establishments to get away from the dirt and noise of the railroad, in part to the pull of business on Fourth Street. While it is almost impossible to determine with accuracy the precise weight of the factors involved, it is clear that the development of Albuquerque as a highway center has played an important part in the growth of business and the development of the cruciform plan as it now exists.

Since the year 1536 when Cabeza de Vaca made his historic east-west trek across southern New Mexico, the state has been traversed by numerous persons, Spanish grandee, Indian warrior, American cowboy, and many others traveling in an east-west direction. Whenever possible they have avoided the northwestern section of the state because of its relative impassability. Elsewhere they have been largely concerned with seeking the easiest passes in the high mountains and with avoiding the many mesas, buttes, lava flows, and isolated mountain ranges found in the state. When they traveled north or south, they followed either the Rio Grande or the Pecos River because there they found water and a direct route.

The present road system follows the old trails of these early inhabitants more closely than might be imagined. Highway 85 follows approximately the Santa Fe Trail from Raton to Santa Fe, then parallels the Rio Grande to El Paso (see Fig. 4). There is, however, no road which now travels the length of the Pecos. The east-west highways also tend to follow old trails. West of the Rio Grande, Oñate, Coronado, and many subsequent travelers followed the line of the western pueblos, Laguna, Acoma, and Zuñi into Arizona, and today Highway 66 takes a similar course. Highway 70 follows in part the Chisholm Trail and the Butterfield Trail. Highway 60 follows the general course of the Jim Stinson Trail east of the Rio Grande. Only Highway 80 east of the Rio Grande has no trail counterpart.

Until the 1930s, Highway 66 was less important than the other major highways in the state. Most of the Texas traffic came in over Highways 60, 70 and 80 (see Fig. 4) and missed Albuquerque unless the travelers were going into the Jemez Mountains or the Sangre de Cristo. A large part of the traffic from southern California traveled Highways 70 and 80 while a similar proportion of northern California traffic went around by Salt Lake City and Cheyenne. That traffic which did come from the west by way of Grants to Los Lunas (see Fig. 4) was apt to go south to Highway 60 instead of north to Albuquerque. Much of the traffic from Denver, Kansas City, St. Louis, Chicago and the east, however, came in over Highway 85. Albuquerque was getting considerable traffic from the east and north by way of Highway 85 and comparatively little from the west and southeast. Within the last ten years the automobile traffic through Albuquerque, both from the east and southeast and from the west, has been greatly increased by the completion of Highway 66.

It was almost inevitable that much of the through east-west traffic in New Mexico should eventually pass through Albuquerque. The city lies south of

the main mass of the Rocky Mountains at the first point available for through east-west traffic and is therefore on the shortest route between southern California and the east. It lies on a route which has less snow in winter than the Cheyenne-Salt Lake City route and, on that account, should have most of the winter traffic as well as a large share of the summer traffic. It is the largest city in New Mexico and the largest city between Pueblo, Colorado and El Paso, Texas on the one hand, and between Amarillo, Texas and Los Angeles, California on the other. It is situated far enough from other large towns in the state to be an objective for travelers as an overnight stop. It lies 179 miles west of Tucumcari, 62 miles south of Santa Fe, 152 miles north of Hot Springs, and 144 miles east of Gallup (see Fig. 4). Although ostensibly the automobile tourist wants to see the "country," he wants to make an overnight stop in a town big enough to have good stores, well-equipped garages, and satisfactory accommodations. Albuquerque meets all of these requirements.

In spite of these natural advantages, it was only recently that Albuquerque began to realize on them. Safe in her commercial pre-eminence as a railroad town, she paid scant attention to through roads in the early stages of their development. She regarded the tourist business as something hardly worth struggling for and left it to the other towns in the state.

The first concrete road in the vicinity of Albuquerque was constructed largely for the benefit of local traffic. Albuquerque taxes made Bernalillo County the richest in the state. In 1909-10, part of the tax money was used to construct a concrete road six miles long, the first built in the state, from Albuquerque north to Alameda on Highway 85. Soon afterward, Highway 85 was paved with concrete 12 miles south of Albuquerque, again largely for the benefit of local traffic. Otherwise, Highway 85, the only through highway leading into Albuquerque, was allowed to remain in an ungraded or partly graded condition.

As time went on, it became apparent that the tourist trade was a major business and that Albuquerque was losing much of it to other parts of the state. Slowly Albuquerque began to wake up. She saw to it that the kinks were taken out of Highway 85 and a black-top surface applied to it. She began to make efforts to get Highway 66 which was being made a through highway both to the east and to the west.

On the west, through Albuquerque influence, Highway 66 was routed direct to Albuquerque over the Laguna Cutoff instead of south by way of Los Lunas (see Fig. 4). The Laguna Cutoff, extending from Albuquerque to Correo, was opened April 13, 1935 and completely paved with a black-top surface August 31, 1936.¹⁹ From that time on, east-west transcontinental traffic has gone west out of Albuquerque along West Central Avenue, now part of Highway 66, instead of south along South Fourth Street which is Highway 85.

Meanwhile a similar change was taking place just east of Albuquerque. Some years previous, Bernalillo County had built seven miles of concrete road east from Albuquerque toward the Sandia Mountains. The U. S. Forest Service,

¹⁹ New Mexico State Highway Department, personal communication, December 12, 1941.

under local pressure, built more road along the same route through Tijeras Canyon. At the same time Highway 66 had been constructed and paved from Chicago via St. Louis, Tulsa, Amarillo, and Tucumcari to Santa Rosa, 118 miles east of Albuquerque. Because of the bad stretch between Santa Rosa and the Sandia Mountains, tourists from the east were forced to go north just west of Santa Rosa until they joined Highway 85 west of Las Vegas. This took them 81 miles out of their way. This detour was partially eliminated when the Santa Rosa Cutoff (see Fig. 4) was opened on November 6, 1937, and entirely eliminated when the paving was completed, August 14, 1938.²⁰

Since the routing of Highway 66 through Albuquerque, the tourist business and especially the tourist court business there has increased by leaps and bounds.

THE TOURIST COURT AS A FACTOR IN THE URBAN GEOGRAPHY OF ALBUQUERQUE

The city of Albuquerque is admirably suited to an investigation of the tourist court as a factor in urban geography. Its favorable geographic location and size have already been mentioned.²¹ Not only does it lie well below the southern end of the main mass of the Rocky Mountains, but it also lies in the semi-arid Southwest where tourist courts seem to flourish best. Tourist courts abound in Albuquerque. Finally, the two main highways which traverse Albuquerque are approximately at right angles to each other so that there is little likelihood of the courts of one highway influencing the urban pattern along the other except, perhaps, where they intersect.

Examination of Fig. 3 will reveal three striking facts about the location of the tourist courts: (1) That, with one exception, they are all located along the two main highways; (2) That the great majority of the courts are located outside the city limits; (3) That the business core of the city tends to become associated with the tourist courts.

All of Albuquerque's tourist courts, with the exception of Stuart's Exclusive Trailer Park (Fig. 3, A2) are located on Highways 66 and 85. Apparently the average tourist is unwilling to search out the tourist court on a side street as he would the tourist home in New England or New York. It may be that he is less patient or more tired or both in the West, perhaps because of the greater distance often traveled in a day there. Whatever the reason, it seems clear that the average tourist in the West simply drives until he is tired and then falls into the first attractive court that presents itself to his befogged gaze. This makes it imperative to locate the courts directly on the main roads. Trailer camps form a small proportion of the total number of courts in Albuquerque and on that account are presumably better known. They need more space than the ordinary court. Stuart's Exclusive Trailer Park is located in a pleasant open field on a paved road (alternate Highway 85) half a block east of Highway 85, and its owner apparently feels that the advantage of situation over-balances that of immediate access to the highway even though that may necessitate dependence

²⁰ New Mexico State Highway Department, *ibid.*

²¹ *Supra*, pp. 59-60.

on the patronage of former tenants and the recommendations of other court owners.

Many of the advantages of a location outside the city limits have already been recited.²² In addition to the items making for the comfort of the tourist, certain economic advantages possessed by the owner of a court outside the city limits should be mentioned. Land is often less expensive there than near the center of town. Furthermore, there are no city taxes to pay and no city zoning laws to worry about.

The tendency of the courts to attract a subsidiary business core is well illustrated at area A1, Fig. 3. Here the first auto camps and the first modern tourist courts in Albuquerque were built, just outside the then existing city limits. This "North Fourth Street" area became a separate shopping center with its own stores, restaurants, garages and junk-yards. Taken into the city on a promise to pave North Fourth Street to its full width and install lighting, this community thrived after as well as before that event. Other courts were soon built out beyond it.

To the south, tourist courts sprang up in area B, Fig. 3, across the Barelás Bridge. Business grew southward to and beyond the city limits toward this bridge. It seems likely, however, that this growth of business is due largely to the trade of the people who lived nearby rather than to the tourist courts. Tourist courts avoided the east end of the bridge because this area is the old village of Barelás, occupied for the most part by laborers employed in the Sante Fe shops. A small-town slum is a poor place to attract tourist trade. The tourist courts here were built when all the traffic west of Albuquerque used Highway 85. The divergence of traffic to the present Highway 66 diverted a large share of their business. However, these courts are still useful to local traffic between Albuquerque and El Paso. Old customers are faithful and there is considerable overflow business from the courts on Highway 66. These courts now alternate with suburban farms and small stores catering to local farmers as well as tourists.

The completion of the Santa Rosa and Laguna Cutoffs and the consequent re-routing of Highway 66 had an almost immediate effect on the tourist court business in Albuquerque. It became overnight the popular route from the Middle West to California. Tourist courts sprang up east and west of Albuquerque extending the east-west arms of the cross until they are now appreciably longer than the north-south arms. Already they have begun to attract subsidiary business cores. The effect on Old Town (see Fig. 3) has been especially marked. The original center or plaza of the Spanish town of Nuestro Señor San Felipe de Neri de Albuquerque is almost deserted. Its stores have all moved over to Highway 66 and new ones have been added there. The growth of the New Town business district westward toward this new center is now in progress. Similarly, growth eastward of a business district which has grown up in the

²² *Supra*, p. 56.

neighborhood of the University and an adjacent suburban district has been greatly accelerated.

Mere recitation of the number of tourist courts in Albuquerque will serve to emphasize their economic importance in the business of the city. In 1940 there were 84 tourist courts in and around Albuquerque. Most of them are shown on Fig. 3, but eight which are located on Highway 66 west of the map are omitted. The total business done by such of these courts as existed in 1935 was, in that year,²³ \$791,000 as compared with \$571,000²⁴ worth of business done by the hotels. In spite of this competition, it seems likely that the development of the highways has improved both the hotel and the restaurant business in Albuquerque by bringing an ever increasing number of customers to each.

FUTURE MODIFICATIONS OF THE CRUCIFORM PLAN

Transportation by rail made out of the simple farming village that centered around Old Town the comparatively industrial Albuquerque of the period 1880 to 1900 with its feeble cruciform pattern. Transportation by automobile, with the tourist court as a characteristic feature, developed the cruciform pattern to its present extent and made the north-south arms double. The future pattern of the city depends on the control of transportation by automobile and the development of transportation by airplane, the newest mode of travel.

It is a commonplace that the automobile multiplies until it so increases the density of traffic that it defeats its own purpose, swift movement. Already Central Avenue, one of the two main streets of Albuquerque, has a traffic density too great to accommodate a main transcontinental highway such as Highway 66. On this account, plans are now being discussed in Albuquerque for building a by-pass away from Central Avenue and around the main business district. The approximate location of one of the proposed routes is plotted in Fig. 3. This route may not be chosen, but a route quite similar in position is the obvious remedy for such traffic congestion. Since only five courts lie along that part of the present route to be affected by such re-routing, it seems likely that there will be little change in the business of existing courts. Should a sufficient number of courts be built on the by-pass to attract a new business area there, then Albuquerque will have a doubly cruciform pattern in an east-west direction as well as north-south. A large number of new courts would no doubt decrease materially the business done by existing courts. The number of new courts now being built in Albuquerque would indicate either that there is more business than can be handled by the existing courts or that the newer courts are able to take business away from the older, less up-to-date ones. If there is indeed more than enough business for all at the present time, that condition will not obtain long.

It is beyond the intent of this paper to investigate in detail the development

²³ U. S. Bureau of the Census; Census of business: 1935 (*ibid.*, pp. 1-4, Table 1), *Tourist camps*, Washington, 1937.

²⁴ U. S. Bureau of the Census: Census of business: 1935 (Vol. 8, pt. 4, p. 17, Table 4), *Hotels*, Washington, 1937.

of Albuquerque as an air traffic center. That it is rapidly becoming such a center can hardly be doubted. The increasingly heavy air traffic furnishes sufficient proof of such a condition. The main airport is now being developed just to the south of point E, Figures 3, 5. Already business is moving in that direction; new streets are being laid out and paved; new residential districts are springing up.

It is evident that Albuquerque is to extend itself toward the southeast. For the first time in its history, the city is being subjected to a force which is not acting in a north-south or an east-west direction. The cruciform pattern is due for some sort of modification. How important this change will be depends essentially on the relative importance of the airplane here both as a military instrument and as a method of transportation for civilian goods and passengers. It seems unlikely that any material change will occur in the immediate future. It seems much more likely that the fundamental cruciform pattern of Albuquerque is now fixed and will persist as the dominant pattern in its urban geography.

Acknowledgements. I am grateful to Mr. Bob Gresham of the *Tourist Court Journal* for the photographs of Lincoln Court and constructive suggestions concerning tourist court history, to Mr. George Savage of Albuquerque for the photograph of Texas Ann Court and helpful information concerning local courts, and to Dr. John Hack of Hempstead, Long Island, for technical assistance on the two maps. It is a particular pleasure to acknowledge my indebtedness to Professor Kirk Bryan of Harvard University who has given me once again encouragement and the benefit of his critical judgment and has placed at my disposal his special knowledge of the city of Albuquerque.

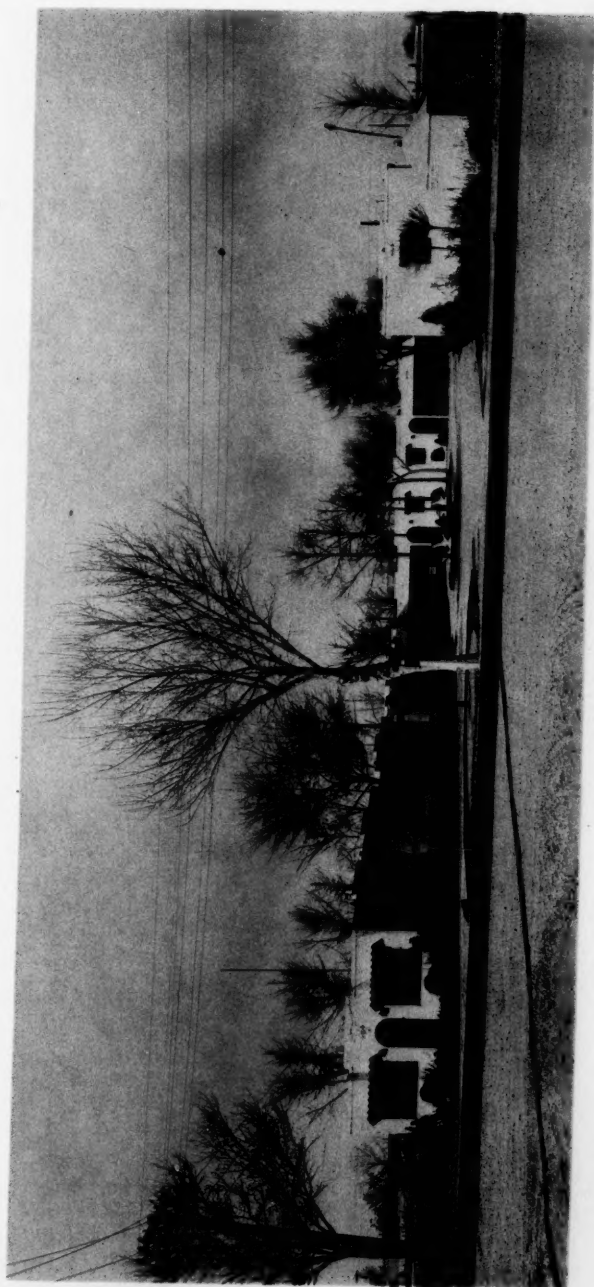


FIG. 1. Texas Ann Court, Albuquerque, N. M.

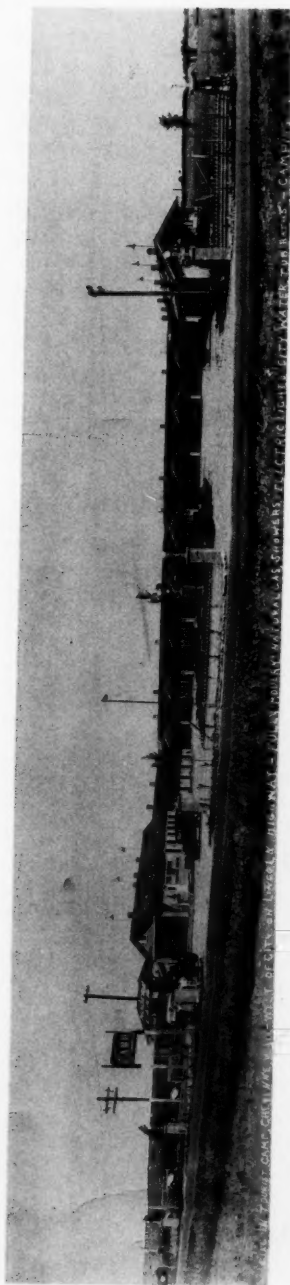


FIG. 2 a. Lincoln Court, Cheyenne, Wyo., in 1936

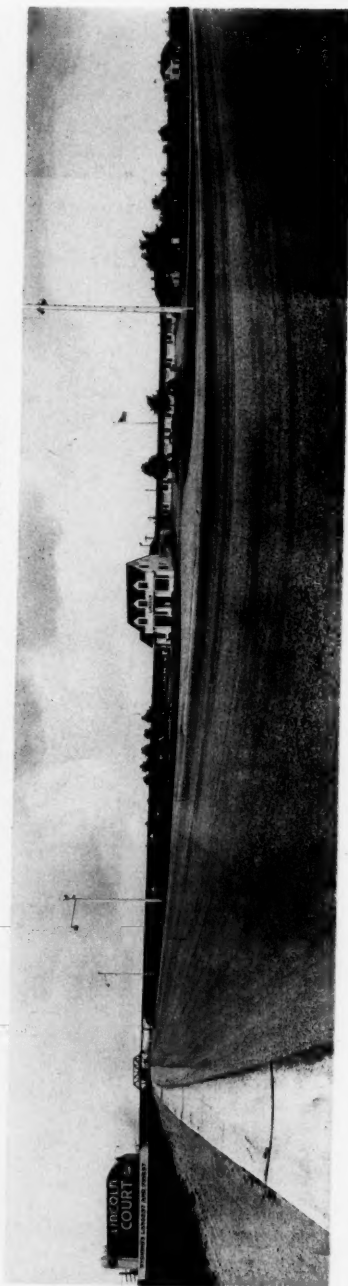


FIG. 2 b. Lincoln Court, Cheyenne, Wyo., in 1941

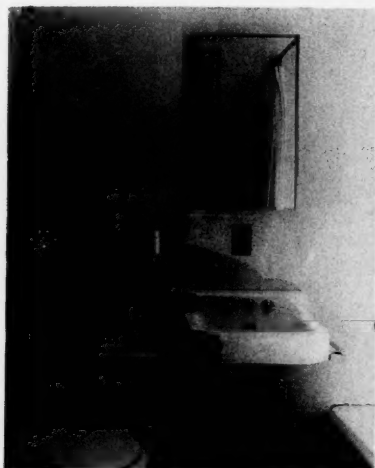


FIG. 2-c

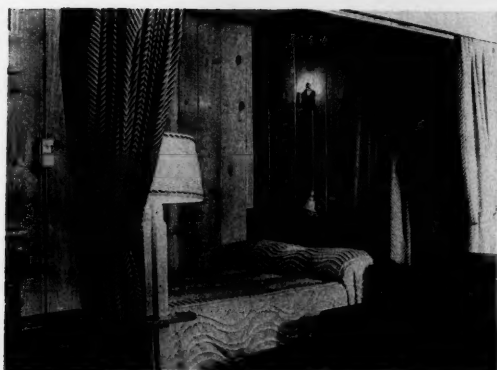


FIG. 2-d



FIG. 2-e

FIG. 2 c-e. Lincoln Court, Cheyenne, Wyo. Interiors

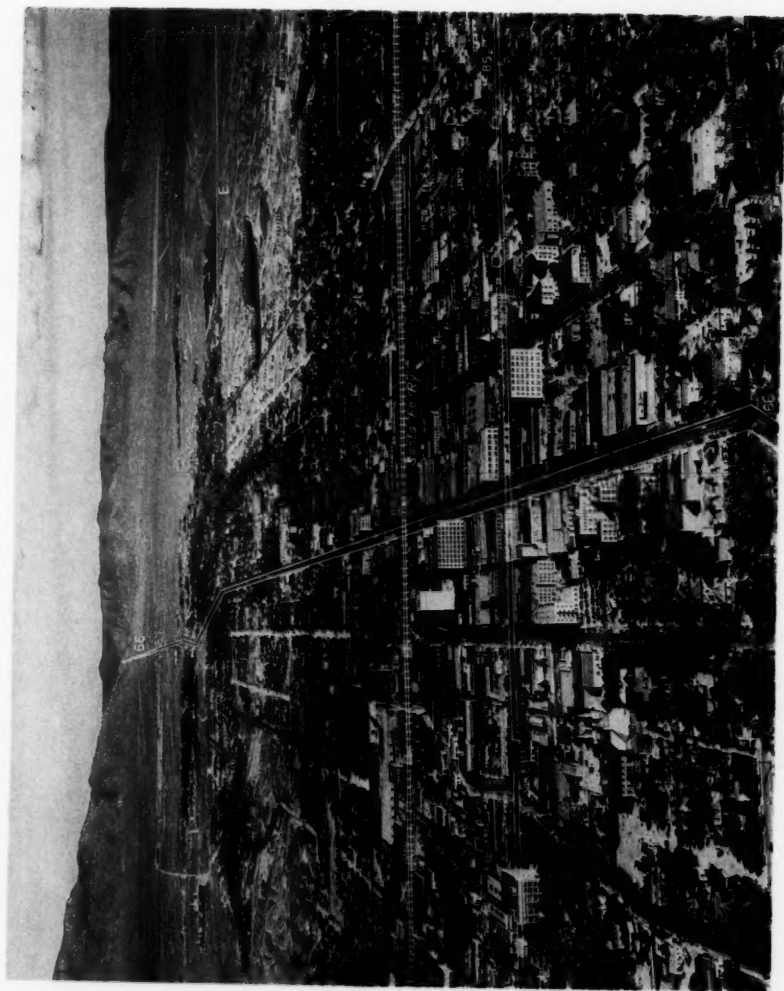


FIG. 5. Air Photo of Albuquerque, N. M.

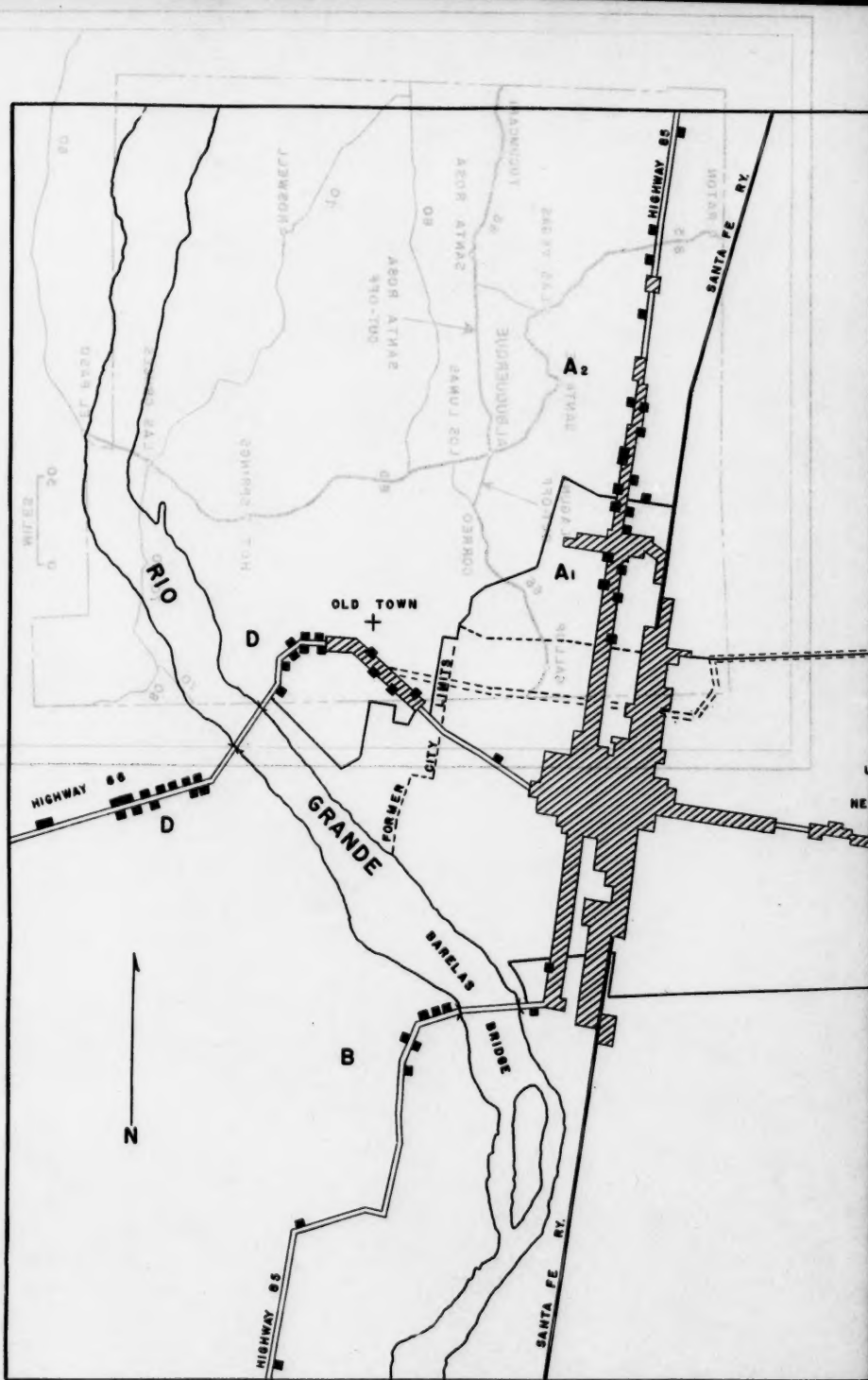


FIG. 3. Map of Albuquerque

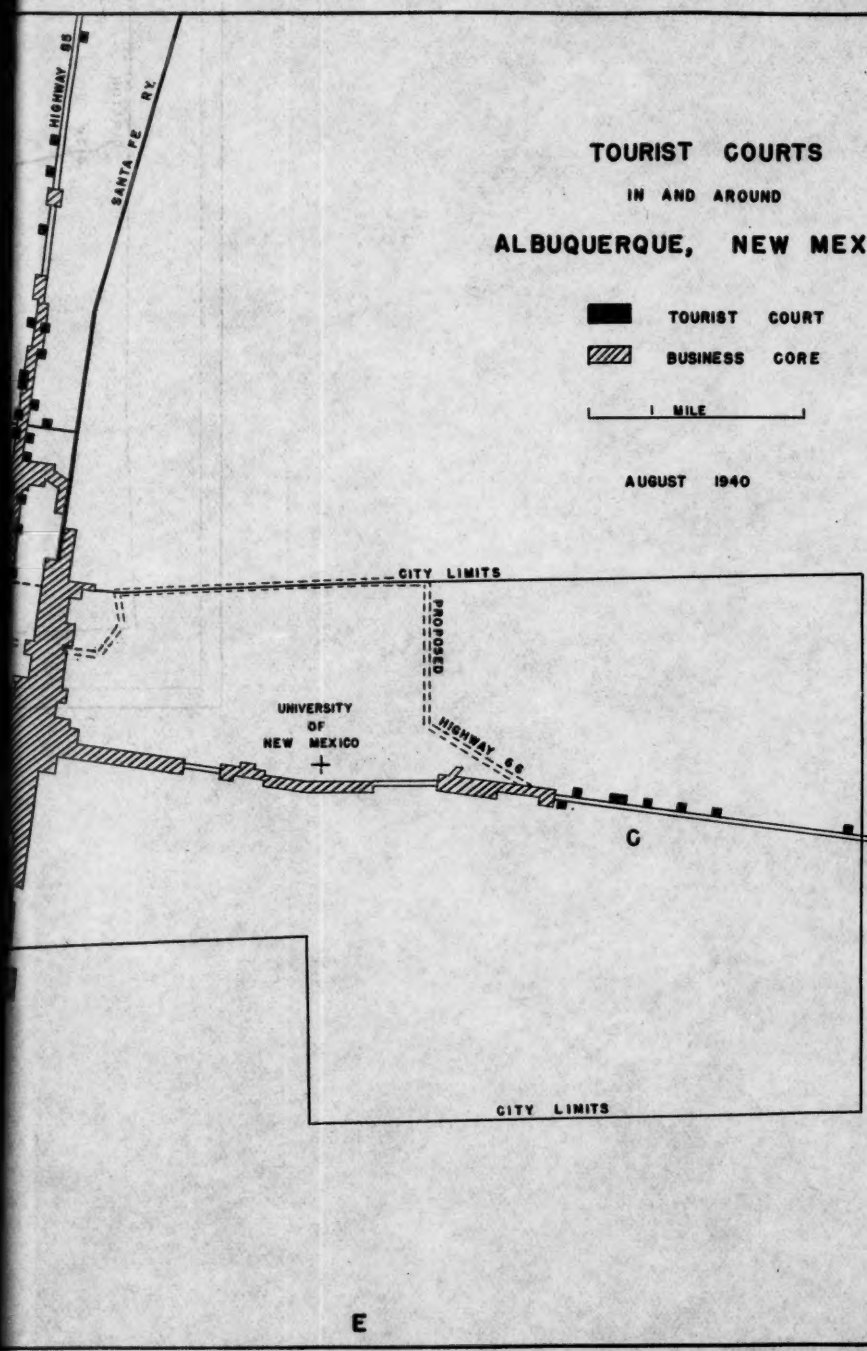


FIG. 3. Map of Albuquerque, New Mexico

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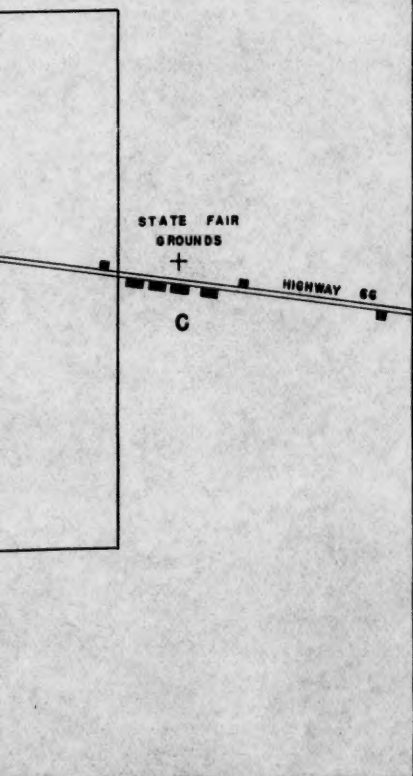
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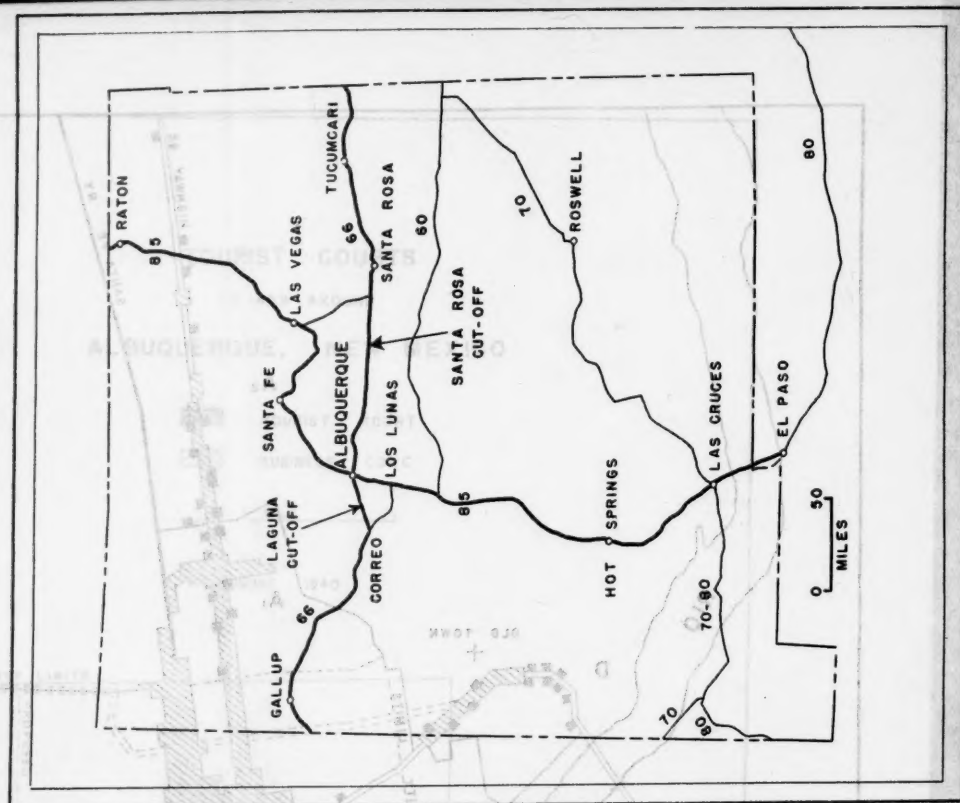
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